Korea monthly shipbuilding magazine

KORSHIP

Shipbuilding · Offshore · Oil & Gas · Offshore wind

2017. 11

Kormarine
Official Magazine
코마린
전시회 공식 매체

Technology

BIG DATA FOR BIG SHIPS

Product Review

ROBUST HARDWARE FOR EXTREME ENVIRONMENTS: INDRACONTROL XM2201

Issue

DSME developed a LNG cargo containment system

SHI put to sea the world's largest Egina FPSO

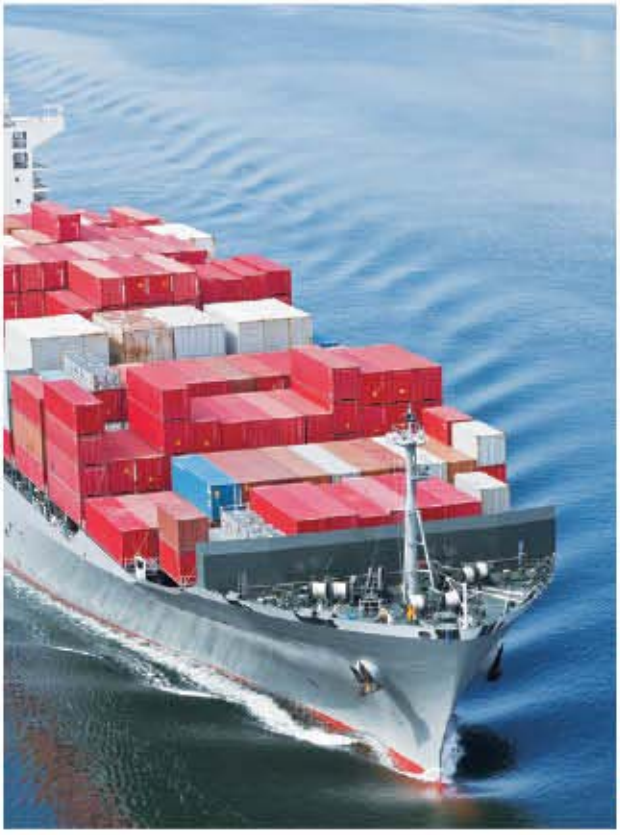
ABB acquires Tekomar and extends its ABB Ability™ digital offering

(Source: Hyundai Heavy Industries Co., Ltd.)

ADOS
EST. 1900

115년 전통의 독일가스 전문업체

Continuous measurement of gases



ADOS GTR 210

Application :
Chemical industry, Manufacture of paints and varnishes, Plastics processing plants, Sewage works, Biogas plants, Gas-fired boiler systems, Liquid gas storage houses, Laboratories, Oxygen concentration, measurements, Refineries, Cold storage houses, (ammonia monitoring), Paint spraying booths, Gas tankers, Container ships, Offshore plattforms, Applications in aggressive environments

(주)인터피엔
INTERPEEN

서울시 구로구 디지털로 26길 111 JnK디지털타워 210호
전화 : 02)6124-5750~2 팩스: 02)6124-5753
URL: www.interpeen.co.kr
E-mail: msbang@interpeen.co.kr

월간 KORSHIP 발행

2016년 개정판

조선 & 해양 총람

Offshore & Shipbuilding Guide

조선&해양 총람 '2016년 개정판' 발행

월간 KORSHIP은 지난 2013년 조선해양 관련업계의 관심과 협조에 힘입어 국내 처음으로 '조선&해양 기업총람(Offshore & Shipbuilding Guide)'을 제작해 발행했습니다.

이번에 월간 KORSHIP은 국내 조선업계의 요구에 따라 '2016년 개정판'을 새롭게 발행하게 되었습니다. 2016년 개정판은 기존 2013년 총람 (1,008개 업체)에 비해 50% 이상 업체가 추가되어 총 1,600여 곳의 조선&해양 업체 정보가 수록되어 있습니다.

발 행 사: 프로콘 (Procon) / 월간 KORSHIP
발 행 일: 2016년 7월 20일
연 락 처: (02) 2168-8896~8899
팩　　스: (02) 6442-2168
홈페이지: http://www.korship.co.kr

&. 2016년 개정판 조선해양 총람 구매와 관련해 기타 자세한 사항은 전화문의(02-2168-8896) 또는 본사 홈페이지(www.korship.co.kr)를 참조해 주십시오.

procon　KORSHIP

Opening the Arctic passage
with Azipod® propulsion.

ABB's Azipod® propulsion solution is a gearless steerable system with the electric propulsion motor located in a submerged pod outside the ship hull, thereby providing 360-degree movement that greatly improves the maneuverability of ice-going vessels. The turning unit allows the propeller thrust and wake to be directed against the ice, meaning it can be effectively used in ice management tasks such as breaking the vessel through ice ridges, and breaking level ice or pack ice to smaller pieces.
www.abb.com/marine

Reliable guidance for 70 years

70 YEARS
Quality in Control.
1947–2017

Offshore 부터 Hazardous area 까지
전 산업분야에 적용 가능한 HBC-radiomatic의 무선 컨트롤 시스템

Onshore / Offshore | Oil & Gas Industry | Habor & Ship Technology

㈜에이치비씨코리아
(㈜일 지 정 공)

본사 : 부산시 해운대구 센텀북대로 60, 1707호 (재송동, 센텀IS타워)
TEL. 051-780-8330~2 / FAX. 051-461-0063
E-MAIL. info@hbc-korea.co.kr / WEB. www.hbc-korea.co.kr

BOOST PRODUCTIVITY BY 30 PERCENT

Intergraph Smart™ 3D

Gain a competitive edge and accelerate projects with Intergraph Smart 3D, the first and only next-generation 3D plant design solution for the process, power, and marine industries. Smart 3D delivers at least 30 percent more productivity than any other system available today.

Smart 3D now offers powerful rules and relationships that automatre repetitive tasks, enforce design standards, ensure design integrity, and protect design consistency. Benefit from enhanced support for mega-projects thanks to global worksharing, model data reuse, and safety-centric rules.

INTERGRAPH KOREA OFFICE
서울특별시 종로구 청계천로 41 영풍빌딩 9층 우)03188
김효진 차장 TEL)+82 2 3489 0337
https://hexagonppm.com/

HEXAGON
PPM

보다 다양하고 확장성이 쉬운 시스템

APROL process automation

B&R Korea
경기도 안양시 동안구 평촌대로 212번길 55 대고빌딩 11층 tel. 031-476-4766 fax. 031-476-4767

확장성

최소 50 ~ 최대 500,000 I/O 지원

신뢰성

전 영역에서 이중화 시스템 구현

유연성

DB Server, System Configuration,
Operation을 한대의 System으로 구현 가능

통합성

단일 시스템 소프트웨어로 모든 업무를 통합

ETHERNET POWERLINK

open SAFETY

PERFECTION IN AUTOMATION
A MEMBER OF THE ABB GROUP

KROHNE

measure

정직한 유량계

the facts

▶ 혼합(액체+기체) 유량계

MASS FLOWMETER – OPTIMASS 6400
Entrained Gas Management (EGM) Function

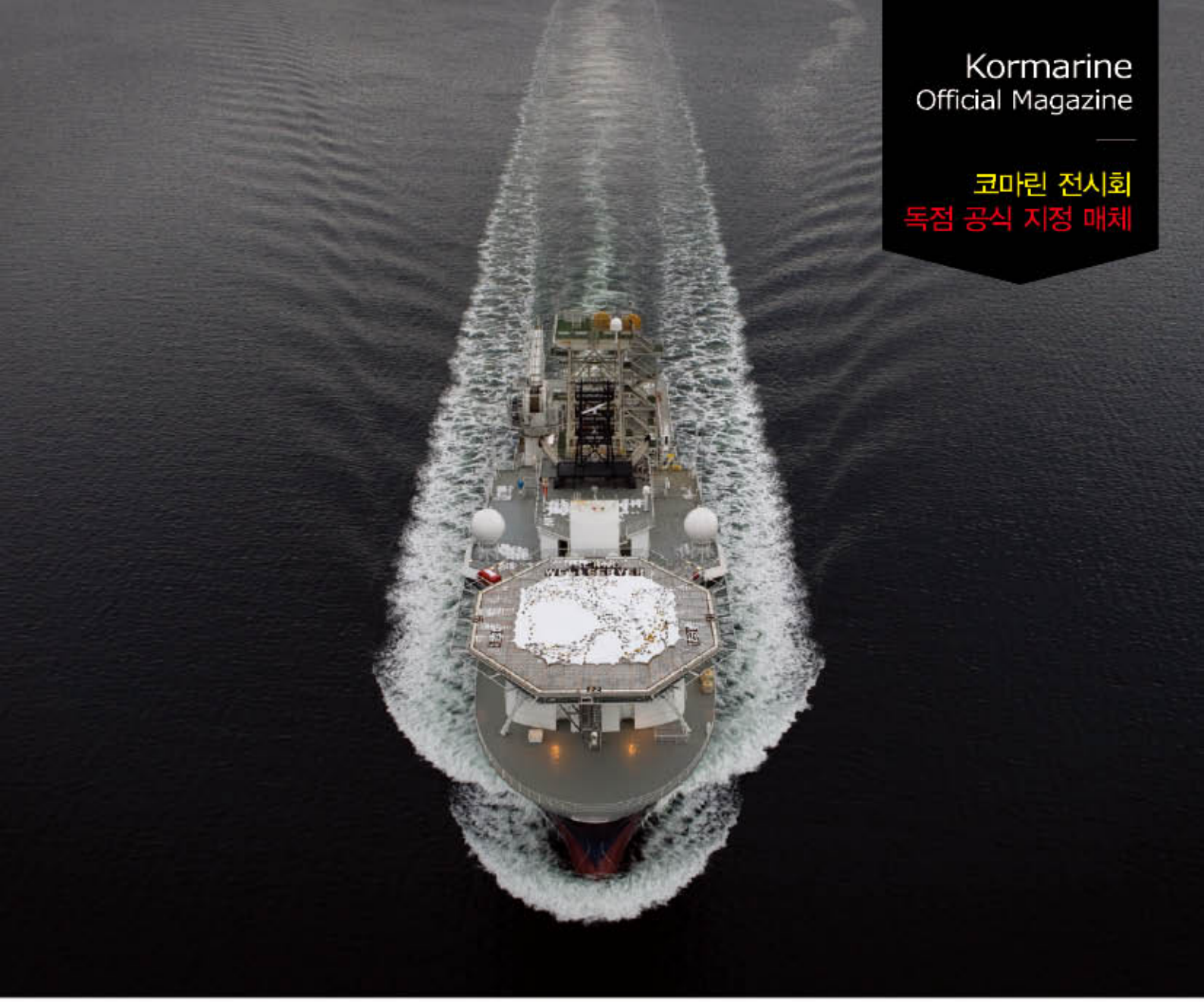
Maintain operation over a wide range of gas fractions, complex flow conditions, and gas & liquid two-phase flow

great partnership

크로네한국지사 | http://www.krohne.co.kr
Tel: 82-2-782-1900

서울 영등포구 여의도동 43 미원빌딩 508호 / korea.sales@krohne.com
부산마린센터 / 여수지부 / 울산지부

FLUENTA SEIKO FLOWCONTROL



Kormarine
Official Magazine

코마린 전시회
독점 공식 지정 매체

Offshore & Shipbuilding Magazine

KORSHIP

Tel: +82-2-2168-8898 Fax: +82-2-6442-2168

www.korship.co.kr

Dräger

Dräger – Your offshore partner.

Safety is of paramount importance in the Oil & Gas industry. Dräger has over one hundred years experience in the design and manufacture of safety equipment and a broad portfolio of products to match this experience. From fixed and portable gas detection products through to smoke hoods and compressed air respiratory protection, Dräger can tailor our response to your specific requirements. With a comprehensive service and training programme, we can help to ensure your equipment and personnel are always ready – whatever the situation.
www.draeger.com/shipbuilding-industry

Draeger Korea Co., Ltd. #8-S21, 10, Chungmin-ro, Songpa-gu, Seoul, Korea (05840) Tel. +82-2-708-6400

Dräger. Technology for Life®

iWELDEX 2018

제5회인천국제용접.절단및레이저설비산업전

The 5th International Welding, Cutting & Laser Equipments Exhibition Incheon Korea

2018년 5월 23일(수)~25일(금) 3일간 인천.송도컨벤시아

http://www.welder.kr

대불공단 · 군산공단 · 아산평택공단 · 안산공단 · 시화공단 · 남동공단 · 경서공단 등
서해안 시대의 중심지 인천에서 용접 · 접합 · 절단설비 · 레이저 · 금속가공설비의
새로운 마케팅시장에서 용접인의 도전을 기다리고 있습니다.

조선 · 해양 · 항공 · 항만 · 물류 · 건설 · 자동차 · 조립금속 · 일반금속 등
서해안 시대의 중심 인천으로 용접인 여러분을 초대합니다.

■ 참가문의: 메탈넷코리아 전시사업부문 TeL: 02-3281-5037 Fax: 02-3281-0280

FROM THE BRIDGE TO THE BILGE

Shipbuilding부터 Offshore 시스템까지
모든 조선산업분야에 적용가능한 WAGO의 오토메이션 시스템

- 브릿지에서 기관실까지 모두 포함하는 "Compass" 인증 (BSH)
- 알람 모니터링 시스템, 밸러스트 탱크 및 Cargo 매니지먼트
- 캐빈 오토메이션, 에너지 공급 및 추진 제어
- 이더넷 커뮤니케이션을 위한 Media redundancy

www.wago.com/ship

WAGO

(주)와고코리아 본사: 안양시 동안구 관양동 학의로 268 안양메가밸리 205호
Tel: 031-421-9500 Fax: 031-420-8110

부산 지사: 부산광역시 강서구 대저2동 3153-1 부산티플렉스 127동 201호
E-mail: info.korea@wago.com Web: www.wago.co.kr

"코닉스가 만들면 다릅니다."

KONICS

컬러는 더욱 강렬해지고, 성능은 더욱 진화되었다!

TFT COLOR LCD 터치스크린 기록계

KRN1000 Series CE KC

- 5.6인치 TFT Color LCD(640X480) 터치스크린 채용으로 높은 시인성과 설정 편의성 제공
- 최대 16개의 입력 채널 및 27종의 입력 사양 {TC, RTD, 전압, 전류(Shunt)} 지원
- 다양한 통신 방식 (USB Device, RS422/485, Ethernet) 기본 제공
- 25~250ms 고속 샘플링, 1~3600초 기록 주기
- 내부 저장 메모리(200MB) 및 외부 SD/USB 메모리 (32GB) 지원
- 외부 SD/USB 메모리에 내부 데이터 백업 가능
- 9종의 다양한 그레프 지원
- 4종의 옵션 입/출력 선택 가능 : 디지털 입력(무접점/유접점), 경보출력, 트랜스미터용 전원 출력
- 콤팩트 설계를 통한 설치 공간 절감 (후면 길이 : 69.2mm)

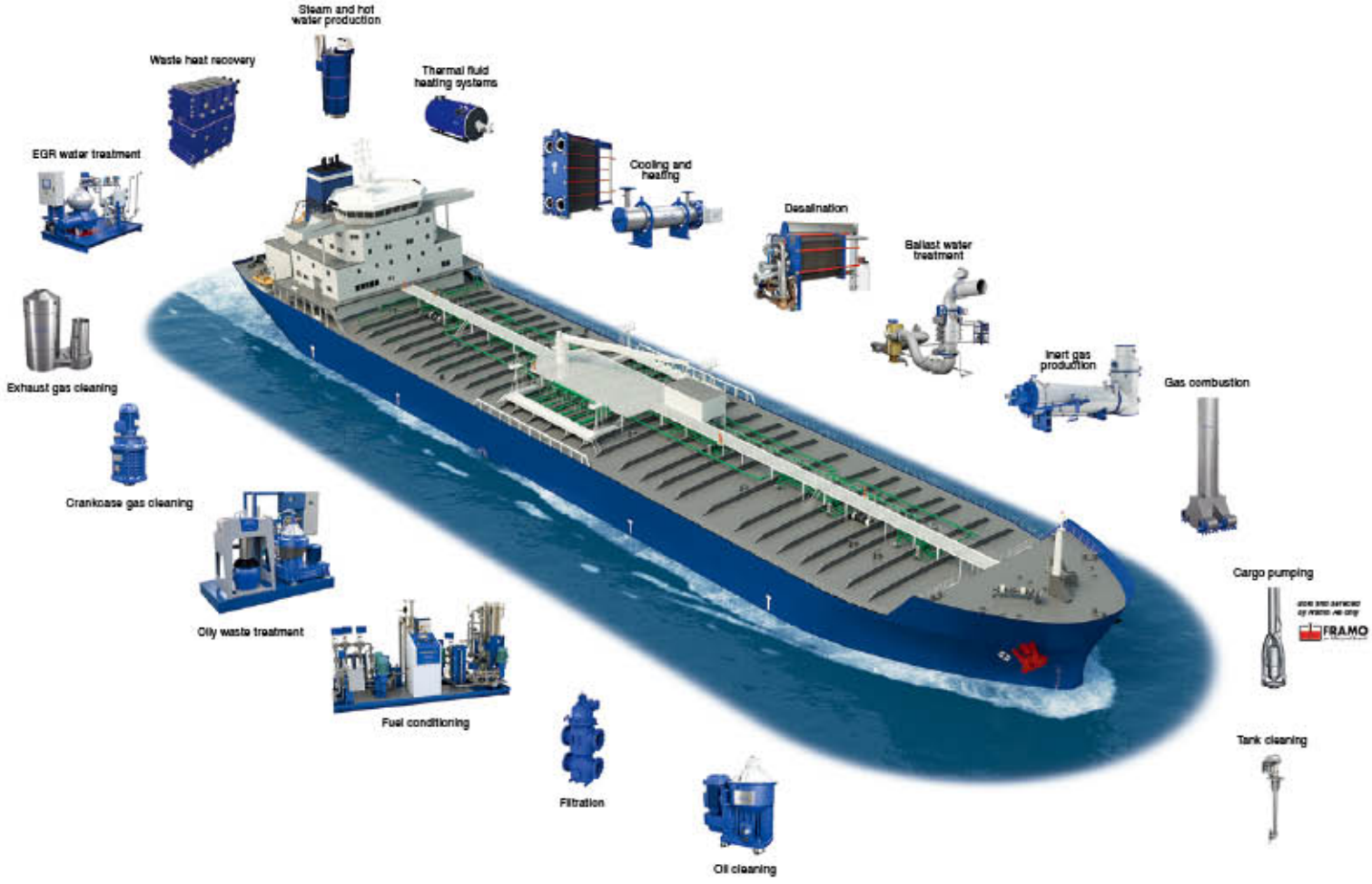
(주)코닉스 | 본사 / 공장 / 교정실 : 인천광역시 연수구 벤처로 36번길 37
영업팀 TEL : 032-820-2300 / FAX : 032-813-9981
교정실 TEL : 032-820-2411~4 / FAX : 032-811-9700 / A/S센터 TEL : 032-820-2356~7 / FAX : 032-813-9979
www.konics.co.kr

ISO 9001

Welcome aboard

From bow to stern, Alfa Laval has the solutions to keep you ahead in a changing marine industry.

You can easily explore many of our key products via your smartphone.



ALFA LAVAL

www.alfalaval.co.kr

For more information, please visit to www.alfalaval.co.kr

Valve automation leader **HKC**

밸브 자동화의 신혁명을 선도하는 기업

전동식 멀티턴 액츄에이터	전동식 리니어 액츄에이터	전동식 쿼터턴 액츄에이터	공압식 헤비듀티 액츄에이터
HM 시리즈	HL 시리즈	HQ 시리즈	ET 시리즈









www.hkcon.co.kr

(주)에치케이씨
HKC CO., LTD

본사/공장
경기도 안산시 단원구 별망로 155
Tel : 031-488-8266
Fax : 031-488-8269
E-mail : hk8266@hkcon.co.kr

서울사무소
서울특별시 금천구 벚꽃로 278
SJ테크노빌 10층 1009호
Tel : 02-2138-8266
Fax : 02-2138-8269
E-mail : hk8266@hkcon.co.kr

부산사무소
부산 강서구 유통단지 1로 41
부산티플렉스 104동 113호 114호
Tel : 051-796-0641~2
Fax : 051-796-0643
E-mail : busan@hkcon.co.kr

“세계일류상품” 선정

’17 과학기술진흥유공자 미래창조과학부장관 표창

’15 방호장치보호구 품질 대상 수훈

’14 우수자본재개발 은탑산업훈장 수훈

’08 과학기술훈장 수훈

공압식 액츄에이터
HP 시리즈

디클러치기어
HGO 시리즈

밸브위치표시기 (리미트스위치박스)
APL 시리즈

최고의 나노기술 아크릴계 수성 나노페인트

나노팜

아크릴계 수성 도료에서는 실현할 수 없었던 꿈!
(완전 수성 일체형 아크릴 에멀젼 페인트)

친환경 나노팜 방오도료
Anti-Pollution

해양 부유물 부착을 방지하여 선박의 운항효율을 증대시킬 뿐만 아니라 선박의 연료 소모량을 줄임으로써 이산화탄소 배출량을 감축하는 탁월한 효과가 있습니다.

나노팜 도료만의 탁월한 장점

- **친환경 수용성 도료**(유기, 유해물질 불포함)
- **강한 접착력**(콘크리트, 목재, 금속, 염화불소, 수지, 섬유 등)
- **다양한 용도**(방오, 방청, 선저방조, 내후성, 내열, 차열)
- **취급이 용이한 "완전수성 액상"**(솔, 롤러, 건등 시공 가능)
- 알루미늄, 스텐, 구리 등에도 사용가능

취급도료 | 수성 방수 도료 | 수성 차열 도료 | 수성 단열 도료 | 수성 절연 도료 | 수성 내열 도료 | 특수 발열 시트 |

제조원 ナノファーム株式会社
長野県駒ヶ根市赤穂11476番地23
【お問い合わせ】電話 0265-98-0621 FAX 0265-98-0622
メールinfo@nano-farm.co.jp
【ホームページ】http://www.nano-farm.co.jp/

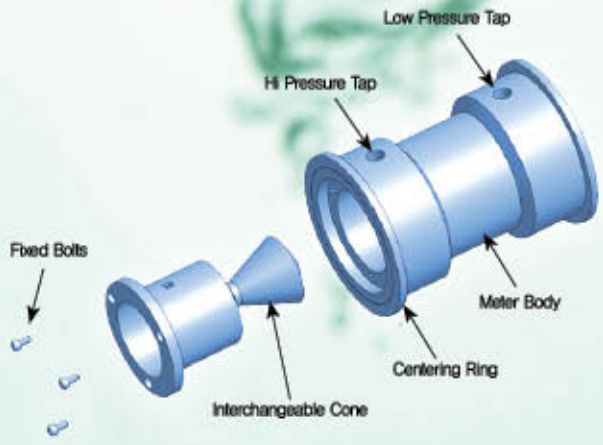
한국총판 H2C (주)에이치투 H2 CORPORATION | 서울 서초구 서초대로 48길 89-4 UH빌딩 501호 TEL. 02. 501-1589 / FAX. 02. 501-2554

대리점 HB 한벤하이테크 HAN BEN HIGH TECH | 서울시 마포구 모래내로1길 3 한두빌딩 307호 TEL. 02. 303-0816 / FAX. 02. 303-0814

(주)하이트롤과 함께하는 Oil & Gas Companies

Cameron ExxonMobil Chevron TOTAL bp

Cone Meter



HFV-WM (Wafer type Cone Meter) **IVCM** (Integral Valve Cone Meter)

DP HiCone Meter

DP HiCone Meter는 일반적인 차압유량계의 일종이며 차압유량계와 같은 물리적 원리에 따라 유량을 측정합니다. 조임부 역할을 하는 Cone은 Meter body 중앙에 위치하여 유체의 흐름에 따라 유속을 증가시키고 차압을 발생시킵니다. 두 개의 검출 Tap은 High 와 Low pressure를 DP 전송기로 보내 유량을 지시합니다.

70 % 전단 3D 후단 1D의 짧은 직관부를 가짐에 따라 플랜트 건설에 최대 70 %까지 원가를 절감하는 효과를 가집니다. (미국 CEESI에서 API 22.2 TESTING)

±8 % Cone Meter는 제조공정상의 사소하게 보이는 차이에도 교정하지 않으면 최대 ±8 % 의 오차가 발생할 수 있습니다. 정확도 ±0.5~1 % 수준의 정밀한 유량측정을 위해서는 반드시 교정을 해야 합니다. (미국 CEESI에서 발표한 내용중)

하이트롤에서 생산되는 Cone Meter는 **ISO 17025 국제공인 교정시스템**에 의해 교정하며 ±0.5 %의 정확도를 가집니다.

HFV-WM

HFV-WM은 Meter body의 교체 없이 Cone을 교체하여 유량 범위를 변경할 수 있으며, 과도한 유속 또는 슬러그 뭉치의 충격으로 인한 Cone의 변형에 쉽게 교체 사용할 수 있는 특징을 가지고 있다. 또한, Wafer형태로 설치가 용이하고 모든 구성품이 정밀 기계가공되어 측정정확도가 우수하며, 용접부가 없어 압력부의 건전성이 확보 되었다.

(특 허 : 제 10-0915088호)

IVCM

IVCM은 차압식 유량계의 필연적 구성품인Manifold Valve를 Meter body와 일체형으로 제작하여 공정 시 발생할수 있는 연결부의Leak를 최소화 하고, 설치시 공사 비용 및 시간을 줄이는 장점을 가진다.

(특 허 : 제 10-0915089호)

HITROL HITROL CO., LTD.

FCC FCC CO., LTD.
FLOW CALIBRATION CENTER

유체 유량(ISO 17025) 국제 교정기관

(주)하이트롤 본사 · 공장 · 연구소
경기도 파주시 조리읍 팔학골길 141
TEL : (031) 950-9700 FAX : (031) 943-0878/5600
http:// www.hitrol.com E-mail : hitrol@hitrol.com

(주)에프씨씨
TEL : (031) 950-9752 FAX : (031) 950-9796
E-mail : fcc@hitrol.com

KORSHIP | Shipbuilding Offshore Oil & Gas Offshore wind

Contents

Advertisers Index

APM the 15th edition of ASIA PACIFIC MARITIME
Shipbuilding & Marine • Workboat • Offshore

2018년 3월 14-16일
마리나 베이샌즈 | 싱가포르
Hall A, B, C, D, E & F | www.apmaritime.com

당신을 아시아 조선해양, 선박, 해상 커뮤니티와 연결해 드립니다

27년의 역사를 가진 APM은 산업 전문가들이 인정하는 아시아의 주요 전시회입니다.

당신이 있어야 할 곳 - 기회의 바다에서 당신의 전략을 펼쳐보세요

APM에서 전략이 당신을 모든 곳에 데려다 줄 것입니다

2016 전시 개최 결과

- **6** 21,000sqm 이상에 다다르는 전시관 6개
- 60개국 **1,500**명 이상의 전시자
- **14**회 동안의 검증된 기록 (1990년 이래로)
- **14,954** 아시아 방문자
- **17** 공식 국가관
- **62** 명의 저명한 연사

APM2018참가문의처 | T: +65 6780 4586 | E: apm.sales@reedexpo.com.sg

주최: Reed Exhibitions

광고: aif Approved International Fair

후원: MPA SINGAPORE, SINGAPORE EXHIBITION & CONVENTION BUREAU

개최: YourSingapore

금색 스폰서: WEICHAI

/asiapacificmaritime | /company/asiapacificmaritime

Mission Statement

Korship helps not only to share informations and technologies of shipbuilding & offshore industry between users and potential suppliers but also introduce subscribers up-to-date shipbuilding & offshore related technologies and informations to become a shipbuilding & offshore industry technical journal.

Korship puts advertising domestic companies in touch with abroad buyers and tries to contribute development and growth of domestic shipbuilding & offshore industries by introducing world's new technologies, news, companies and products to superintendents, engineers, Korea branch of abroad companies, domestic shipbuilding & offshore companies and all related companies.

Technology

World's up-to-date indispensible informations of shipbuilding & offshore companies, products and system technology described to help people who engage in the industry.

Special Focus

Provide articles deeply focusing on latest shipbuilding & offshore industry technologies, logistics and port etc.

Company & Comments

Introduce latest tendency and related news of industry through company interview.

Product

New shipbuilding & offshore industry products overview

Business News

Issues and news articles from global shipbuilding & offshore companies and organizations

INMEX CHINA

5 – 7 December 2018
Poly World Trade Center
Guangzhou, China

The 8th Edition of the

Leading & Definitive International Maritime Expo

in the Pearl River Delta Region, where the Maritime Community Converge

BOOK YOUR STAND TODAY TO SECURE PRIME LOCATION!

Violet Yong
Exhibition Director
+65 6411 7709
violet.yong@informa.com

Eileen Quek
Assistant Project Manager
+65 6411 7721
eileen.quek@informa.com

Another Quality Event by:
informa exhibitions

www.maritimeshows.com/china

SHI delivered a drillship one and a half years ahead of schedule

Samsung Heavy Industries (SHI) announced that it delivered 1 drill ship, ordered from the U.K.-based Ensco, to the ship owner on September 29. This vessel was christened 'ENSCO DS-10' in a naming ceremony held at Geoje shipyard on September 20 prior to its delivery. This drillship, ordered to SHI in a contract worth approximately USD 520 million in 2013, measures 220m in length, 38m in width, and 18m in height and can drill to a maximum depth of 40,000ft (12km) and operate up to 12,000ft (3.6km) of water depths. In particular, this drillship has optimized design and improved operating efficiency of thrusters (fitted to the lower part of drillship hull), reducing fuel consumption by 50% during operation compared with previous models. Furthermore, this drillship was designed as an eco-friendly vessel that can be outfitted with multi-stage water filtration system, MOx emission reduction system, etc.

The delivery of this drillship had been postponed from August 2015 request of ship owner due to the deteriorating market conditions. However, early delivery was requested after a drillship charter contract was signed with Ensco last July, thus moving up the delivery date by one and a half years. As a result, SHI will receive the remainder in the amount of USD 75 million upon delivery of drillship.

The early delivery by SHI signifies that the market demand is rebounding slowly, led by drillship of the up-to-date highest-end specifications. According to Clarkson Research, as many as 7 drillships have been contracted for chartering since July although only 2 drillships for deepwater operations were contracted for same purpose in the first half of this year. Particularly, Ensco decided to charter this drillship delivered recently, instead of the 3 drillships waiting to be chartered out of its existing fleets. This reflects the preference of charterer for the latest model drillship with excellent drilling performance and operating efficiency.

An official from SHI said, "With recent early delivery of drillship signifying a turnaround in market conditions, we expect that the up-to-date drillships built to the highest-end specifications will be deployed first for drilling operations."

삼성중공업, 드릴십 1척 1년 6개월 조기 인도

삼성중공업은 영국 엔스코(Ensco)로부터 수주한 드릴십 1척을 지난 9월 29일 선주사에 인도했다고 밝혔다. 이 선박은 인도에 앞서 지난 20일 거제조선소에서 열린 명명식에서 'ENSCO DS-10'으로 명명됐다.

삼성중공업이 지난 2013년에 약 5억 2,000만 달러에 수주한 이 드릴십은 길이 220m, 폭 38m, 높이 18m 규모로 최대 수심 12,000ft(3.6km)의 해상에서 해수면으로부터 최대 40,000ft(12km)까지 시추할 수 있는 드릴십이다. 특히, 이 드릴십은 선형을 최적화하고 트러스터(Thruster, 드릴십 선체 하부에 장착되는 추진기)의 운용 효율을 개선함으로써 이동시 연료 소모량을 종전 모델 대비 50%나 절감했을 뿐 아니라, 다단계 수질오염 정제시스템, NOx 배출저감 장치 등을 장착할 수 있는 친환경 선박이다.

이 드릴십의 최초 인도 예정일은 2015년 8월이었지만, 시황 악화로 선주 측에서 두 차례 연기를 요청하면서 인도가 2019년 3월로 미뤄졌다. 그러던 중인 지난 7월 엔스코 드릴십 용선계약을 따내면서 선박의 조기 인도를 요청, 예정일을 1년 6개월 앞당겨 조기 인도할 수 있게 되었다. 이에 따라, 삼성중공업은 드릴십 인도시 받게 되는 잔금 7,500만 달러도 이번에 수령하게 됐다.

삼성중공업의 이번 조기 인도는 최신형 고사양의 드릴십을 중심으로 시장 수요가 조금씩 살아나고 있다는 것을 의미한다. 클락슨리서치에 따르면 올 상반기에 신규 용선계약을 체결한 심해용 드릴십은 2척에 불과했지만, 지난 7월 이후 드릴십 7척이 신규 용선계약을 체결했다. 특히 엔스코는 기존 선대 중에 미용선 상태의 드릴십 3척이 있음에도 불구하고, 이들 대신 이번에 인도한 드릴십을 용선 계약에 투입하기로 결정했다. 용선주가 시추 성능과 운항 효율이 우수한 최신형 드릴십을 선호하고 있기 때문이다.

삼성중공업 관계자는 "이번 드릴십 조기 인도 사례와 같이 시황이 회복되면 최신형 고사양 드릴십부터 시추 작업에 투입될 것으로 예상된다"고 설명했다.

DSME developed an LNG fuel tank for 180,000-ton ore carrier

Daewoo Shipbuilding & Marine Engineering (DSME) announced on October 12 that it completed development and design of LNG fuel tank (MCTIB) applicable to 180,000-ton bulk carriers in a move to keep pace with the trends towards large vessel powered by LNG (Liquefied Natural Gas) amid enforcement of ever more stringent international environmental regulations.

This LNG fuel tank for transportation of ores adopted the high-manganese steel (Mn) developed jointly by DSME and POSCO and is a stand-alone Type-B highly resistant to sloshing (impact caused by fluctuation of liquid stored in tank). In particular, this fuel tank which adopted high manganese steel has the advantage of greater resistant to external impacts and greater optimization of the space, compared to conventional fuel tanks that use aluminum alloys. Moreover, this fuel tank reduced production cost by half, increasing the cost competitiveness.

In the meantime, the LNG-fuelled ore carrier developed recently by DSME was designed to have the fuel tank installed on the deck of the stern to prevent loss of cargo while flexibly maintaining the fuel tank capacity necessary for operations on desired routes. Along with that, this LNG-fuelled ore carrier features stronger hull structure, optimized design and can be outfitted with various fuel-saving equipment. Powered by LNG, it was designed as an eco-friendly vessel with highest efficiency to meet environmental regulations, slashing emissions of carbon dioxide, sulfur, and nitrogen compounds drastically, compared to conventional vessel operating on bunker C oil.

An official from DSME said, "With successful development of this ore carrier LNG fuel tank, DSME has completed full line-up of LNG fuel tanks for various types of vessels, including ultra-large containership, oil tanker, and LPG carrier and will be better placed in winning orders."

Meanwhile, DSME is expected to win an approval of its ore carrier LNG fuel tank and related ship design upon completion of review by the world-renowned DNV-GL and AIP (Approval in Principle) slated to be granted soon. DSME is currently undergoing same procedures for approval from the Lloyd's Register (LR).

대우조선해양, 18만톤급 광석운반선용 LNG 연료탱크 개발

대우조선해양은 선박에 대한 국제 환경규제 강화로 액화천연가스(LNG)를 연료로 사용하는 대형 선박이 늘어나는 추세에 맞춰 180,000톤급 광석운반선(Bulk Carrier)에 적용할 수 있는 LNG 연료탱크(MCTIB)의 개발 및 설계를 완료했다고 지난 10월 12일 밝혔다.

이번에 개발한 광석운반선용 LNG 연료탱크는 대우조선해양과 포스코가 공동개발한 고망간강(Mn)이 적용되며, 독립형 탱크인 Type-B로써 슬로싱(탱크 내부에 저장된 액체의 요동에 의해 발생하는 충격)에 강한 구조적 특성을 가지고 있다. 특히 고망간강을 적용한 이 연료탱크는 기존 알루미늄합금을 주로 사용하던 연료탱크에 비해 외부 충격에 강하고 공간을 최적화 할 수 있다는 장점이 있으며, 제작에 필요한 생산비도 절반수준으로 줄어 원가경쟁력에도 기여할 수 있을 전망이다.

또한 대우조선해양이 이번에 개발한 LNG추진 광석운반선은 연료탱크를 선미 갑판위에 설치해 원하는 운항항로 조건에 필요한 연료탱크 용량을 탄력적으로 운영하면서도 화물손실이 없도록 설계됐다. 이와 함께 강화된 선체구조, 안전성에 최적화된 선형, 각종 연료 절감형 장치를 설치할 수 있으며, LNG를 연료로 사용함에 따라 기존 벙커씨유 대비 이산화탄소, 황, 질소화합물 배출량을 획기적으로 줄일 수 있어 환경규제에 대비한 최고효율의 친환경선박으로 설계됐다.

대우조선해양 관계자는"이번 광석운반선 LNG 연료탱크의 성공적 개발로, 대우조선해양은 초대형컨테이너선, 유조선, LPG선에 이어 전 선종에 대한 LNG 연료탱크 풀라인업을 갖추게 됐다"며"향후 수주전에 유리한 고지를 선점할 수 있을 것으로 예상한다"고 말했다.

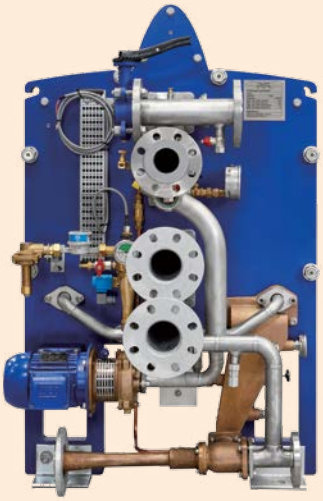
한편 대우조선해양은 광석운반선용 LNG 연료탱크 및 이를 사용하는 선박 디자인에 대해 세계 유명 선급인 DNV-GL의 리뷰를 거쳐 현재 기본승인(AIP) 과정 중에 있어 빠른 시일 내에 승인을 받을 예정이며, 로이드선급(LR)과도 동일한 절차를 진행 중에 있다.

Alfa Laval AQUA Blue S-type freshwater generator cuts power consumption by almost 70%

When it was introduced in 2008, Alfa Laval's AQUA freshwater generation technology cut seawater needs and pump-related power consumption in half. With today's AQUA Blue S-type, the need for electrical power is further reduced – to just one-third that of conventional freshwater generators.

The new AQUA Blue S-type uses the same 3-in-1 AQUA plate technology as the original C-type configuration. But it maximizes energy efficiency and capacity-to-footprint ratio by making use of the vessel's existing seawater cooling system pumps. This cuts electrical power needs by 70% compared to conventional freshwater generators, and it shrinks the already small AQUA Blue footprint by up to 15%.

"AQUA freshwater generation technology revolutionized energy use in a very well-established application," said Alex Jönsson, Global Business Manager for Alfa Laval freshwater generators. "With the AQUA Blue S-type, we further reduce the energy-relat-



Alfa Laval AQUA Blue S-type

ed costs for ship owners – as well as the installation costs for shipyards."

Besides its smaller footprint, the AQUA Blue S-type offers shipyards a considerable amount of new flexibility, including a range of connection alternatives. Because it makes use of the vessel's seawater cooling system pumps, it employs a smaller ejector and a smaller, separately installed ejector pump. Likewise, the pipework can be both shorter and smaller in diameter.

In addition, the S-type handles a wider span of pressures, which means the configuration can be adapted to the highest or lowest water level. An adapted configuration is able to deal with higher pressure in the overboard line, which allows the freshwater generator to be placed more freely on board.

Having the choice between an S-type or C-type configuration of AQUA Blue ensures an ideal match for ship owner and shipyard priorities. The AQUA Blue C-type, which has a combined cooling water and ejector flow, has a single seawater connection to the vessel's sea chest. This makes it independent of other equipment and conditions in the vessel's seawater cooling system.

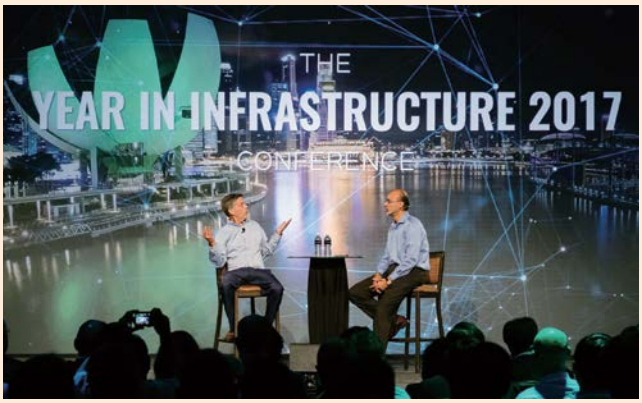
"Whichever configuration customers choose, they will receive a truly robust solution," said Jönsson. "AQUA Blue is designed not only for energy and footprint savings, but also to last the lifetime of the vessel."

Bentley Systems and Topcon collaborate for Constructioneering Academy initiative

Topcon Positioning Systems, a world leader in positioning instruments for survey and construction, and Bentley Systems, a leading global provider of comprehensive software solutions for advancing infrastructure, announced on October 9th at the Year in Infrastructure 2017 Conference that they have joined efforts to provide opportunities for construction industry professionals to learn best practices in constructioneering, a process of managing and integrating survey, engineering, and construction data, to streamline construction workflows and improve project delivery.

"The future of construction automation continues to move forward today with efforts like constructioneering. Together with Bentley we are helping reshape the traditional surveying, engineering, and construction workflows," said Ray O'Connor, president and CEO of Topcon Positioning Systems. "Our efforts are proving successful in several phases of project delivery, particularly in road resurfacing, but the opportunities to expand its benefits are tremendous. That's a big driver for creating the Constructioneering Academy."

Bentley Systems' CEO Greg Bentley said, "The growing momentum in demand for infrastructure project delivery across the world, against finite resources including an aging construction workforce, makes 'going digital' imperative. We and Topcon, and early adopters of constructioneering over the past year, have become convinced that heavy civil construction can lead the way, starting by 'industrializing BIM' through digital workflows which make the work of surveyors, engineers, and constructors automated, continuous, and continuously more valuable, throughout the project lifecycle. Also over the past year, we and Topcon have advanced our digital co-venture to jointly deliver constructioneering technologies through instant-on cloud services, federating our respective connected data environments and applications."



Constructioneering enables engineers to begin work with an accurate 3D model of current construction site conditions (as captured by Topcon's UAS photogrammetry and laser scanners) which then can be processed into engineering-ready 3D reality meshes (by Bentley's ContextCapture software). Cloud services convey the engineers' work directly to construction processes in the field.

The resulting digital engineering models work with the 3D machine control that guides construction machinery. Compared to traditional workflows between design and construction in which data in the digital engineering models is often lost and inefficiently recreated, constructioneering provides seamless integration for constructible models that offer real-time updates and data exchange for improved efficiency and cost reduction.

Topcon and Bentley will collaborate to create the Constructioneering Academy curriculum which will be implemented through existing learning centers located in Livermore, California (Topcon), Houston, Texas, and London, UK (Bentley).

벤틀리시스템즈와 톱콘, 컨스트럭셔니어링 아카데미 이니셔티브 공동 작업

측량 및 시공용 위치 측정 기기 분야의 세계적 리더인 톱콘포지셔닝시스템즈(Topcon Positioning Systems)와 인프라 발전을 위한 종합 소프트웨어 솔루션을 제공하는 글로벌 리더인 벤틀리시스템즈(Bentley Systems)는 지난 10월 9일 'Year in Infrastructure 2017 컨퍼런스'에서 컨스트럭셔니어링(constructioneering) 모범 사례를 학습할 기회를 제공을 위해 협력한다고 발표했다. 컨스트럭셔니어링(constructioneering)은 시공 산업 전문가들에게 측량, 엔지니어링, 시공 데이터를 관리하고 통합하여 시공 워크플로우를 간소화하고 프로젝트 납품을 개선하는 프로세스이다.

"시공 자동화의 미래는 현재의 컨스트럭셔니어링 같은 노력을 향해 전진하는 것이다. 톱콘은 벤틀리와 함께 전통적인 측량, 엔지니어링, 시공 워크플로우를 혁신하고 있다"라고 톱콘포지셔닝시스템즈의 레이 오코너(Ray O'Connor) 사장 겸 CEO는 말했다.

"우리의 노력은 프로젝트 납품의 여러 단계, 특히 도로 재포장 부문에서 성공으로 증명되고 있지만 이점을 확대할 기회는 여전히 무궁무진하다. 이것이 컨스트럭셔니어링 아카데미를 계획한 주된 동기다."

벤틀리시스템즈의 그렉 벤틀리(Greg Bentley) CEO는 "고령화된 시공 인력을 포함해 리소스가 한정된 상황에서 전 세계는 증가하는 인프라 프로젝트 납품 수요의 '디지털화'를 필연적으로 요구되고 있다. 벤틀리와 톱콘은 지난해 컨스트럭셔니어링의 얼리 어답터로서 프로젝트 생애주기 동안 측량 기사, 엔지니어, 시공자의 작업을 자동화하고 유지하며 지속적으로 가치를 창출하는 디지털 워크플로우를 통해 'BIM의 산업화'를 시작으로 대규모 토목 시공이 선도 역할을 할 수 있다고 확신하게 됐다. 또한 지난해에 벤틀리와 톱콘은 디지털 코벤처를 발전시켜 각자의 커넥티드 데이터 환경과 애플리케이션을 연결한 인스턴트온 클라우드 서비스를 통해 컨스트럭셔니어링 기술을 공동으로 제공했다"고 말했다.

컨스트럭셔니어링은 엔지니어가 톱콘의 무인 항공기 사진 측량법과 레이저 스캐너로 포착된 현재 시공 부지 조건의 정확한 3D 모델을 가지고 작업을 시작할 수 있도록 해준다. 이 3D 모델은 벤틀리의 ContextCapture 소프트웨어에 의해 엔지니어링 지원 3D 현실 매쉬로 처리될 수 있다. 클라우드 서비스는 엔지니어의 작업을 현장 내 시공 과정으로 직접 전달한다.

디지털 엔지니어링 모델 성과품은 시공 기계에 대한 3D 기계 제어 장치에 사용된다. 설계와 시공 간의 전통적인 워크플로우에서는 디지털 엔지니어링 모델의 데이터가 손실되고 비효율적으로 재 작성되기도 하는 반면, 컨스트럭셔니어링이 제공하는 끊김 없이 통합된 시공 가능 모델은 실시간 업데이트와 데이터 교환이 이루어져 효율성을 개선하고 비용을 절감한다. 톱콘과 벤틀리는 공동 작업으로 컨스트럭셔니어링 아카데미 교육 과정을 개설하고 이 교육 과정은 캘리포니아주 리버모어(탑콘), 텍사스주 휴스턴, 영국 런던(벤틀리)에 있는 기존 학습 센터를 통해 진행된다.

Mackay Communications & Inmarsat's Fleet Xpress Partnership

Mackay Communications Inc., a worldwide marine electronics and airtime service provider, is proud to announce it has signed a Partner agreement with Inmarsat to distribute its award-winning Fleet Xpress service to the global maritime market including deep sea vessels, commercial fishing, oil and gas, defense, and cruise-passenger lines.

Mackay will offer a complete end-to-end Fleet Xpress package including the full range of Fleet Xpress airtime service options and choice of approved antennas. The partnership will also include a global 24/7 installation and service agreement; leveraging Mackay's technical expertise to support the rapidly growing installation and conversion opportunities for Fleet Xpress systems in ports worldwide.

"Inmarsat's Fleet Xpress service delivers seamless and reliable global connectivity at high-speeds, with automatic and unlimited fail-over to FleetBroadband when needed, and all for a predictable flat monthly rate. This is what our customers need to operate their business efficiently, while contributing to the health and welfare of their crews," commented Matthew Krupinski, Director of Satellite Services at Mackay Communications.

"The Fleet Xpress partnership enables Mackay to offer customers a "future-proof" communications package - unique in the maritime industry providing global high-speed coverage, dual Ka and L band antennas for continuous connectivity, together with speeds and service guarantees previously only available with much larger, high-power antennas," stated Kai Madsen, Marine Sales Manager at Mackay Communications.

Fleet Xpress customers will benefit from Mackay's expertise in satellite communication systems and reputation as a turn-key integrator for new-build and retro-fit customers of all vessel classes. Mackay's dedicated Satellite Services Division provides 24/7 technical system support, consolidated billing, and a team to advise on terminal and airtime plans to match client requirements and budget.

Gerbrand Schalkwijk, Chief Sales Officer, Inmarsat Maritime

Combining Inmarsat's cutting-edge technology with Mackay's extensive marine and offshore customer base, solution-focus integration expertise, and worldwide service, is a powerful formula to enhance the adoption of Inmarsat's Fleet Xpress service.

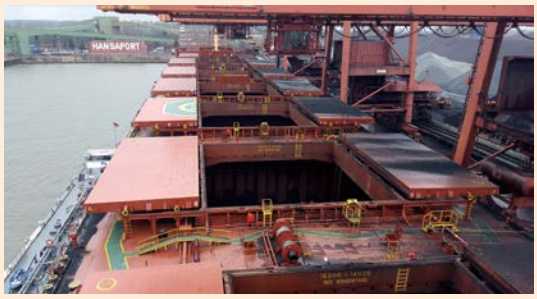
Wilhelmsen Ships Service launch new line of cargo hold cleaning equipment

Wilhelmsen Ships Service (WSS) are launching a new line of cargo hold cleaning equipment at INMEX India, South Asia's largest maritime exhibition. Enabling crews to get the right cleaning results, irrespective of where stains are located, scaffolding, ladders and specialist-cleaning crews are no longer required.

Expanding its cargo hold cleaning line in direct response to clearly identified customer needs, WSS have developed a high pressure lance and add-on heating system tailor made for cleaning difficult to reach areas of the hold.

Dubbed Anaconda, because of its impressive size and power, with the high pressure lance measuring over twenty metres and attached hose twenty-five metres, WSS believe cargo hold stains in elevated areas should no longer pose vessels crews any problems.

Mark Oliver Wittburg, Product Marketing Manager, Cleaning Solutions, WSS is so convinced of the system's value he believes the Unitor HPCE Anaconda Lance Kit should become an essential piece of equipment for all vessels regularly carrying cargoes prone to leaving persistent stains.



"Tried and tested onboard, the crew can easily assemble the cleaning kit and safely use it get at all those hard to reach problem stains and oily residues. With the additional heating unit warming water up to 100°C, which is then delivered through the high-pressure lance at up to 500bar, excessive amounts of cleaning chemicals are completely unneeded."

Along with consistently helping the vessel's crew to deliver spot test approved results, Wittburg believes that the Anaconda system can also help drastically reduce costs from the outset. He said, "The price of the complete kit may at first glance seem prohibitive, but compare it to several failed attempts at cleaning the hold or the typical outlay for a professional cleaning gang for a single job. The Anaconda system will all but pay for itself after its second use."

With specialist, third-party cargo hold cleaning gangs charging anything between 10,000 USD and 50,000 USD per job, depending on the circumstances, providing the vessel's crew with the right tools to achieve the correct cleaning results first time around will be preferable for many owners and operators.

Manoeuvred into position using a simple guide rope system and capable of delivering high pressure cleaning up to 20 metres in height, WSS suggests the Unitor HPCE Anaconda Lance Kit is used in combination with the Unitor HPCE 520 INOX water heater to ensure the best possible results.

HMD receives approval in principle for cargo handling system design for 6,600m³ LNG bunkering vessel

Hyundai Mipo Dockyard (HMD) has received approval in principle (AiP) from Lloyd's Register (LR) for a cargo handling system design for a 6,600m³ LNG bunkering vessel.

HMD and the Hyundai Heavy Industries (HHI) Corporate Research Centre jointly developed the cargo handling system design based on their extensive experience of building gas carriers. HMD chose to develop the LNG bunkering vessel design because of the potential for growth in the LNG-fuelled ship sector.

The cargo handling system is designed for LNG bunkering to a LNG-fuelled ship, as well to supply fuel gas to the dual-fuel main engine and managing Boil-Off Gas (BOG). The cargo pumps are capable of bunkering at a maximum of 1,100m³/h to a LNG-fuelled ship and fuel gas to dual-fuel main engine can be supplied by BOG compression or LNG vaporing. BOG returned from the LNG-fuelled ship during bunkering can be burnt in the dual-fuel engine or collected inside the Type C cargo tank.

Insulation for the cargo tank is designed for lower BOG generation. BOG generated from the cargo tank is less than the fuel gas consumption of the main engine at the normal continuous rating. This means that all BOG

can be utilised by burning in the main engine so that the cargo tank pressure and temperature can be managed in a stable manner.
A HMD official commented "HMD and the HHI Corporate Research Centre expect that a cargo handling system for larger LNG bunkering vessels and LNG carriers can also be developed based on this approved design for a 6,600m^3 LNG bunkering vessel."
LR's Jin-Tae Lee, Ph.D, Korea Chief Representative & Marine Manager, said "We are pleased that LR LNG carrier specialists and Busan Technology Support Office, headed by Y.D. Kim, have provided and facilitated their vast experience through the entire gas technology supply chain to support HMD and the HHI Corporate Research Centre to achieve the required level of compliance with the international regulations for HMD's design, and this is endorsed by issuing the AiP certification."

BP's Glen Lyon FPSO classed by DNV GL

DNV GL has awarded class to BP's Glen Lyon Floating Production Storage and Offloading (FPSO) vessel located west of Shetland. DNV GL's Maritime and Oil & Gas business areas have been working closely together, to provide BP with a broad range of technical skills required for the challenging conditions in which the FPSO will operate.
Glen Lyon is a purpose-built FPSO which is expected to produce 130,000 barrels of oil a day at peak production. The vessel was transferred into class shortly after first oil in May 2017.
The classification scope covers the essential elements of the marine vessel, the structure, floatability, station keeping, and essential marine systems, and ensuring the asset integrity of these key features.
Ernst Meyer, Director of Offshore Class, DNV GL, said "The FPSO market is our most important source of growth for Offshore Class and we have worked systematically to win class transfers over the two last years. The Glen Lyon is coming on top of five other recent class transfers in Brazil, Nigeria and Iran, making DNV GL the leading offshore class society in the industry."

The inspection regime is based around a risk-based inspection (RBI) model, taking into account the knowledge gained from the newbuild engineering and construction. A structural integrity model of the hull was built to manage the asset together with BP.
The work performed by DNV GL on the classification of the hull will also be used in supporting BP's compliance with the UK safety case regime.
Scott Jervis, Regional Offshore Manager, DNV GL, said "We are especially proud to have developed a risk-based inspection process for the classification on this vessel. Throughout this project, DNV GL has shown a broad range of competences from both our Maritime and Oil & Gas business areas, to develop a solution for BP's needs."

Chevron's Taro® Cylinder Lubricant receives approval from WinGD

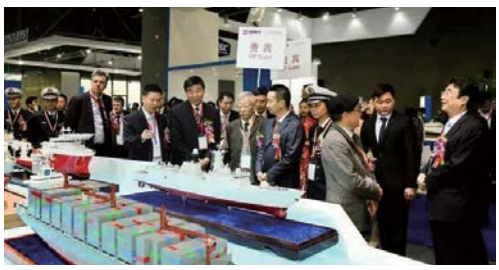
Chevron Marine Lubricants has received a No Objection Letter (NOL) from Winterthur Gas & Diesel (WinGD) for the use of its Taro® Special HT 100 cylinder lubrication oil in a number of the manufacturer's engines when operating on a wide variety of fuels from 0.0% to 3.5% sulphur, including fuels compliant with emissions control area (ECA) regulations with a maximum content of 0.10% sulphur, therefore removing the need to change cylinder lubricants when operating in and out of ECAs.
This follows 2,000 hours of validation testing on-board a Panamax containership fitted with a Wärtsilä 8RT-flex82T engine. Taro Special HT 100 has been specifically formulated for high performance, and demonstrated enhanced

performance in distillate fuel applications under laboratory engine conditions.
The NOL applies to the use of Taro® Special HT 100 in WinGD X, WinGD X-DF, WinGD RT-flex, WinGD RT-flex-DF, Wärtsilä RTA, Wärtsilä RT-flex and Wärtsilä X engines as well as in Sulzer 2-stroke engines, that are operating on bunker fuels with a sulphur content ranging from zero to 3.5% by weight.
Chia Yoo Soon, General Manager of Chevron Marine Lubricants, said "We are delighted with the results of the testing and to receive this No Objection Letter from Winterthur Gas & Diesel. It is further evidence of how Chevron Marine Lubricants is helping ship owners and operators reliably navigate the ECA requirements of today, and is ready to meet the challenges of tomorrow as shipping moves into a lower sulphur, lower emissions future."
Chevron's Taro® Special HT 100 is one of a full range of Taro® cylinder lubricants, that from the low 25 BN Taro® Special HT LF to the new 140 BN Taro Special HT Ultra, provide solutions in all operating environments. Taro® Special HT 100 should always be used in line with manufacturers guidelines, and it is recommended to adjust feed rates and conduct drip oil analysis to maintain optimum performance. The Taro® cylinder lubricants range are offered alongside Chevron's DOT.FAS® Service that provides both on-board and on-shore analysis of drip oil giving an accurate measurement of total iron wear, including corrosive wear. It is the best service of its kind in the market today.

댄포스, 서울대학교 조선해양공학부에 발전기금 지원

덴마크의 글로벌 에너지 효율 솔루션 기업 댄포스(Danfoss)가 서울대학교 조선해양공학부에 미래 조선해양공학 인재 양성을 위한 발전기금을 지원한다고 밝혔다.
지난 10월 18일 서울대 조선해양공학부 교수회의실에서 열린 발전기금 전달식에는 댄포스 코리아 김성엽 사장, 서울대학교 조선해양공학과 김용환 교수, 노명일 교수 등 주요 관계자가 참석해 서울대 조선해양공학과에 총 1천 만 원의 발전기금을 전달하고 조선해양분야 미래 인재 양성을 위한 상호 협력에 대해 논의했다.
이날 발전기금을 전달한 댄포스 코리아 김성엽 사장은 "서울대학교 조선해양공학과 발전기금 지원을 통해 대한민국 조선해양공학의 발전을 이끌어나갈 차세대 인재를 지원할 수 있게 되어 기쁘다"며, "댄포스 코리아는 '내일을 위한 기술'이라는 기업 핵심 가치에 걸맞게 대한민국 조선해양 분야의 발전과 미래 인재 양성을 위한 최선의 노력을 기울이겠다"고 전했다.
이와 함께 댄포스는 현재 한국 시장에서 전개중인 자사의 글로벌 브랜드 캠페인 '엔지니어링 투모로우(ENGINEERING TOMORROW)'에 서울대 조선해양공학부 노명일 교수의 참여를 통해 조선해양(Marine & Offshore) 산업을 위한 댄포스 에너지 효율 솔루션 국내 성공 사례를 소개할 예정이다.
한편, 댄포스는 덴마크를 대표하는 에너지 효율 솔루션 선도기업으로 에너지 자급도시로 유명한 덴마크 '삼소 섬(Samso Island)'의 인프라 구축에 핵심 솔루션을 제공한 바 있다. 댄포스는 글로벌 브랜드 캠페인 '엔지니어링 투모로우' 캠페인을 통해 상업용 빌딩(Commercial Building), 콜드 체인(Cold Chain), 조선·해양 분야에서 입증된 혁신적인 에너지 효율 솔루션의 국내 성공 사례를 소비자들에게 전달하는 활동을 전개하고 있다.

INMEX China 2018



INMEX China is the largest and most established international maritime event in the South China Sea region. The 8th edition of the exhibition will feature a greater range of cutting-edge maritime technologies and equipment presented by both local and international exhibitors. This biennial maritime exhibition is the ideal networking platform for the maritime community in Asia.
After 7 successful editions, INMEX China has established itself as the trademark maritime event for industry players and leading brands to showcase their latest marine products, services and technology, as well as the meeting point for key maritime industry leaders to explore new business opportunities in the South China region.
INMEX China 2018 will be held from 5 – 7 December 2018 at Poly World Trade Center, Guangzhou, China. All interested companies in the maritime industry can register to exhibit at www.maritimeshows.com/china.

온도/ 습도/ 이슬 · 노점
기체속도/ 가스/ 압력/ 신호 전송기

온도/ 습도 신호 전송기

THM80X
합금외함 고정밀형
온습도전송기

THS80X
정밀형 온습도
신호전송기

THS30X
경제형 온습도
신호전송기

THS307
옥외 겸용
온습도 전송기

THR13/THR03
온습도 표시
신호전송기

THS13/14
선형 신호전송기

온도/ 습도/ 노점. 이슬점 측정기

THS88
노점 전송기

THS07
탐촉자형
온습도 전송기

THS86/87
삽입형
노점표시 전송기

SD05
복합형 신호 표시기

TP01
2선식 머리부착형
RTD 온도 신호전송기

TP02
레일부착 (궤조)형
온도신호 전송기

기체/ 가스 측정기

FTM84/85
고정밀 열선풍속전송기
(합금외함, 고속용)

FTS34/35
중속 유속
신호전송기

FTS14
열선풍속
전송기(저속)

FTS07
열선 풍속 전송기
(탐촉자형, 경제형)

AFMT+PMD33
평균 흐름률 측정관/
차압전송기

THG03
실내용 CO2 온습도
표시 전송기

가스/ 압력/ 신호 측정기

GTH53
복합가스 신호전송기

GS33/34
CO2 신호전송기

GM33/34
CO 신호전송기

L051/52
수위감지
신호전송기

THM80X
다기능 디지털
신호 표시 감시기

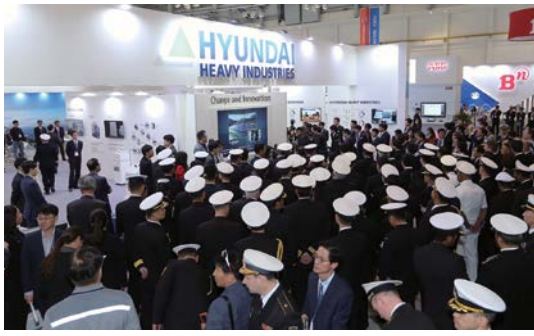
DPT02
레일부착 궤조형
신호변환기

길우트레이딩 1984

서울시 영등포구 선유로 33길 15, 703호(양평동3가, 에이스테크노타워)
TEL: 02-2636-0009 FAX : 02-2636-4753
www.gilwoo.co.kr www.gilwooshop.co.kr giltron@naver.com

Global shipbuilding and offshore professionals gathered under one roof in Korea: Part 1

- Major exhibitors showcased innovative solutions en masse



KORMARINE 2017 which opened at BEXCO (Busan Exhibition & Convention Center), Busan on October 24 ended with great success on October 27, wrapping up its 4-day run. This year's event drew approximately 1,000 exhibitors from 45 countries despite recession in shipbuilding industry.

Particularly, Korea's 3 shipbuilding heavyweights, such as Hyundai Heavy Industries (HHI), Daewoo Shipbuilding & Marine Engineering (DSME), and Samsung Heavy Industries (SHI), participated altogether for the first time since the launch of KORMARINE. Hyundai Heavy Industries Group participated with Hyundai Heavy Industries (HHI), Hyundai Mipo Dockyard (HMD), Hyundai Samho Heavy Industries (HSHI), along with, Hyundai Electric, Hyundai E&T, Hyundai Heavy Industries Green Energy, and Hyundai Robotics spun off from HHI.

SHI Machinery & Electric System Team, spun off from Samsung Heavy Industries (SHI) last August, participated under the name of 'S&SYS' in this year's event, presenting marine equipment and ballast water treatment projects, etc.

Meanwhile, Daewoo Shipbuilding & Marine Engineering (DSME) presented technologies related to the business area where it showed strong performance in the shipbuilding and offshore industry. Moreover, prominent domestic and overseas companies, including ABB, Nexans in Korea, Bosch, Emerson, Alfa Laval, E-Tech, KROHNE, etc., participated in this year's event, presenting shipbuilding technologies and related products such as equipments and offshore equipments.

HHI presented ship solutions, including LNG-related technologies and BWMS

Hyundai Heavy Industries (HHI), Hyundai Heavy Industries Group, including Hyundai Mipo Dockyard (HMD), Hyundai Samho Heavy Industries (HSHI), Hyundai Electric, Hyundai Global Service, set up booths covering an area of 274m^3 (approximately 83 pyong) in KORMARINE and showcased the latest technologies in shipbuilding and offshore industry, along with promotion of each group company.

As the environment-friendly LNG takes on an added importance in the midst of enforcement of ever more stringent environmental regulations, Hyundai Heavy Industries Group intensively promoted its cutting-edge technologies and facilities related to LNG carriers and LNG-fuelled vessels such as LNG fuel supply system, LNG re-liquefaction system and LNG test facilities.

In particular, Hyundai Heavy Industries Group attracted attention of visitors to its state-of-art ship solutions coping with the challenges of the Fourth Industrial Revolution in shipbuilding and offshore industry, such as economic ship operating system capable of collecting and analyzing ship operation data in real time with information and communication technology (ICT) to improve the operating efficiency and safety of ships. In addition, Hyundai Heavy Industries Group presented facilities related to offshore plants such as FPSO which have begun to be ordered on the back of recent rise in international oil prices.

An official from HHI said, “We are striving to break out the persistent recession in the shipbuilding industry by fully leveraging the momentum created by eco-friendly vessels and ICT. In KORMARINE, HHI will carry out sales activities actively based on technological competitiveness that sets HHI apart from the rest.”

ABB Ability™ opens up a digitally connected world

ABB unveiled the digital solution ABB Ability and showcased related products actively in KORMARINE. ABB Ability which provides connectivity is a customized solution that meets the requirements of different customers, consisting of the industry-leading portfolio of more than 180 digital solutions.

ABB presented innovative products, such as the smart sensor for motor, the most ground-breaking product in ABB Ability portfolio of digital solutions, including Azipod, an electric propulsion system, and turbocharger MXP for marine engines. ABB Ability portfolio of digital products and services encompasses a variety of digital solutions ranging from simple devices, through automation and enterprise solutions, to cloud platforms.

At the booth of ABB, the Collaborative Operations Center, an ABB Ability solution for vessels operating in the world, was demonstrated. The ABB Ability Collaborative Operations Center represents a service incorporating the ABB’s IoT

(Internet of Things) technology to support the operation, engineering and management of vessels with the assistance of experts. With integrated digitization, it increases the ship life-cycle and improves operational efficiency. The support from the Collaborative Operations Center covers the operational monitoring, remote diagnosis, ship information provision, internet portal operation by ship, advanced analysis, state-based maintenance, etc. As many as 9 collaborative operations centers are being operated in Norway, Singapore, the United States, China, Finland, Italy, Sweden and the Netherlands. The service can be provided expeditiously to vessels operating, as well as those moored. The Collaborative Operations Center can curtail the number of service engineers on board by 70% and reduce the costs of maintenance and inspection by classification societies by up to 50%. A target has been set to increase the number of vessels monitored remotely by the Collaborative Operations Center from current 700 units or more to 3,000 units by 2020.

SweeSeng Lee, President of ABB Korea, said, "Digitization is expected to be a key factor in sharpening the competitive edge of shipbuilding and offshore industries. ABB Ability will allow customers to be aware more, perform more and even better, and achieve greater interaction with all things. ABB Ability combines the information, technologies, and know-how accumulated by ABB and will help customers increase and create values."

SHI unveiled the BWMS and automatic ship operation control system

S&SYS, a subsidiary of Samsung Heavy Industries (SHI), participated in KORMARINE and showcased many state-of-art solutions, such as Purimar, a ballast water management system (BWMS) capable of meeting the requirements of environmental regulations set forth by the IMO (International Maritime Organization), ICMS (Integrated Control Monitoring System) for the next-generation automatic ship operation control system, and IAS (Integrated Automation System), etc.

Purima, a BWMS, is a safe and environment-friendly system because it effectively eliminates harmful organisms in the ecosystem and the aquatic environment and at the same time reduces content of active substances used in sterilization process to a level that is not harmful environmentally. For Purima, the U.S. Coast Guard (USCG) approval is imminent.

The automatic ship operation control system represents a technology essential for smart ship touted as the new growth engine and was designed for the next-generation digital vessels incorporating the cutting-edge technologies such as ANS (Automatic Navigation System), AIS (Automatic Identification System), and IMIT (Integrated Maritime Information Technology).

DSME presented models of ice-breaking LNG carriers applying its leading-edge technologies

Daewoo Shipbuilding & Marine Engineering (DSME) unveiled the LNG carriers and frigates which applied the world's best technologies in KORMARINE. Specifically, DSME presented the models of the world's largest 'MOL Challenger' capable of carrying 120,000 tons of LNG and 'FFX Batch-II', the next-generation frigate of the Navy of the Republic of Korea, including the model of 'Christophe de Margerie', the world's first ice-breaking LNG carrier.

DSME is scheduled to deliver its second ice-breaking LNG carrier this year. This vessel, which measures 299m in length and 50m in width, is an 'ARC-7' class ice-breaking LNG carrier capable of breaking through up to 2.1m thick ice. In addition, the 'Mall Challenger' is 345m long and 55m wide, is the world's largest LNG carrier. The FSRU (Floating Storage Re-gasification Unit), which represents an evolution from LNG carrier, is capable of re-gasifying the liquefied natural gas (LNG) at the sea and supplying the re-gasified LNG directly to onshore locations such as gas-fired power plants, etc. In particular, DSME outfitted its own integrated automation system to the FSRU to automate entire processes encompassing the LNG loading, unloading, operation and safety control.

Innovative cable solutions of world's unmatched leader Nexans

Nexans in Korea participated under the name of Kukdong Cables in KORMARINE. It presented a variety of VFD cables currently applied to vessels and offshore plants, including 'Ultra ICEFLEX®', a cryogenic cable developed in 2015 and maintaining its performance even at ultra-cold Arctic temperatures below 65℃.

There has been an upturn in global demand for cables withstanding cryogenic temperatures as energy development projects have been carried out actively even in regions with Arctic temperatures, along with advancement of oilfield drilling technology. ICEFLEX® is a family of non-toxic cables with both oceanic and offshore applications, which are resistant to ultra-low temperature of polar waters. Moreover, ICEFLEX® has excellent mechanical properties and provides excellent performance even in extremely cold environment. In particular, ICEFLEX® is highly evaluated in terms of safety features as it does not emit low-lead and toxic gases when a fire occurs.

In addition, VFD cable has found wide-ranging applications as universal cable in the shipbuilding offshore industry and was designed to provide EMC protection and improve operating performance of bow and side thrusters, mobile streamline propulsion units, winches, top drives, platform lifts and motors, variable frequency drive system in drillship and FPSO (Floating Production Storage and Offloading).

Bosch in Korea participates in KORMARINE 2017

Robert Bosch Korea and Bosch Rexroth Korea jointly participate in this 20th KORMARINE presenting various products as a one-stop supplier for marine and offshore industries and the smart and connectivity solutions along with the current trend of 4th industrial revolution.

A4VSO + Sensor from Bosch Rexroth is with monitoring sensors attached on so that the status of the pumps can be monitored and allows pre-maintenance. Based on the IoT Gateway software, it is possible for example to collect sensor and controller data, transmits it to cloud applications, and enables data analysis. IndraControl XM2201 control hardware, developed to efficiently control these cutting edge hydraulic systems, is for example used for motion control tasks to regulate electric, hydraulic and electro-hydraulic drives and is for use on marine and offshore installations even under extreme ambient conditions. Also, IndraDrive ML electric drive for marine applications can be used as a main power inverter or as a motor inverter. This modular inverter covers a power range from 110 kW to up to 4 MW.

Land & Marine camera, MIC 7000 from Bosch is designed using the latest technology in intelligent imaging and video streaming. Thanks to the intelligent coding and Content-Based Imaging Technology (CBIT), the HD module delivers high resolution video even under challenging light conditions at very low bit rates.

Bosch Rexroth also presents various marine system solutions during the fair such as Continuous jacking system (CJS) which is based on innovative lifting functions, in which 48 hydraulic cylinders directed by a digital control work together seamlessly, Active heave compensation system, and the hydraulic technology for ocean depths, which help increase energy efficiency and reduce the cost.

KCC presented anti-fouling and anti-rust paints applying its leading-edge technologies

KCC showcased the latest trends and technologies of marine paints meeting the requirements of the rapidly changing global market for paints applicable to vessels and offshore structures.

Specifically, KCC presented a variety of high performance paint products for vessels and offshore structures, including the anti-fouling paints preventing aquatic flora and fauna from adhering to the surface of vessels under water, anti-rust paints preventing rusting of iron, topcoats requiring high durability, and PFP fire-retardant paint saving the lives in case of a fire.

An official from KCC said, “Participation in KORMARINE provides good opportunities not only for direct communication with customers to figure out their needs precisely, but also for promoting KCC’s paint brands and products for vessels and offshore structures. Using this opportunity, we will expand our promotion and sales activities to make KCC’s excellent products more easily available to customers around the globe.”

KROHNE presented flowmeter products with high reliability and high performance

KROHNE, a provider of solutions for industrial process equipment such as flowmeters, level meters, pressure gauges, thermometers, etc., presented high-performance flowmeter products applicable to shipbuilding and offshore industry. Major products include mass flowmeter, ultrasonic flowmeter, magnetic flowmeter, etc.

KROHNE’s Coriolis MASS Flowmeter is also suitable for measurement when undesirable gases are included in the process or when media containing gases has to be measured. Particularly, KROHNE’s Coriolis MASS Flowmeter enables stable and continuous measurement of liquid mixed with gas, high-viscosity fluid, and slurry, etc.

For that, KROHNE applied the Entrained Gas Management (EGM™) technology allowing the Mass Fowmeter to operate

without disruption even during transition from 0% to 100% of gas content, namely the transition from pure liquid state to gaseous state and vice versa.

Alfa Laval presented solutions for compliance with ever more stringent environmental regulations

Young-gu Choi, Managing Director of Alfa Laval Korea

Alfa Laval presented the Alfa Laval PureBallast, heat exchanger and inert gas system, etc., which obtained approval of USCG (U.S. Coast Guard) and IMO (International Maritime Organization), including Alfa Laval PureSOx ensuring compliance with IMO SOx emission regulations.

Particularly, PureBallast 3.1 Compact Flex, a new addition to existing PureBallast product line-up, can handle 32-1000 m^3 of ballast water per hour and reduce the footprint by more than 20% compared to existing PureBallast 3.1. In addition, PureBallast 3.1 Compact Flex, which adopted the plug-and-play concept for easy and quick connection, was designed for easy installation even on board existing vessels that have limited space for BWMS installation. According to Alfa Laval officials, PureBallast 3.1 Compact Flex is the most ideal for small to medium-sized vessels and adopted special metal (254SMO) to overcome corrosion problem occurring in existing UV type.

Moreover, Alfa Laval presented the 'PureSOx' reducing harmful sulfur content in exhaust gas emissions from ships operating on bunker oil as fuel. As about 70 vessels installed with PureSOx are still operating among 80 vessels outfitted with PureSOx from 2009, PureSOx is considered to be one of the most reliable solutions for compliance with SOx regulation.

Young-gu Choi, Managing Director of Alfa Laval Korea, said, "Sales from shipbuilding and offshore industry comprise a significant proportion of all sales of Alfa Laval. Particularly, Korea is a very important and meaningful market. KORMARINE is expected to be instrumental very much in promoting excellent technologies of Alfa Laval and further solidifying the reliability of Alfa Laval's products. In addition, we will work closely with our customers in Korea to tread the path of co-growth."

Emerson presented perfect integrated automation solutions

Emerson presented a fully integrated automation solution ranging from the instruments measuring the temperature, flow, level, and pressure inside the ship to the control systems controlling the entire interior of ship with the data transmitted from instruments.

Emerson Process Management provides consultation on design of control equipment and carries out design/assembly of control system and related projects. In addition, it applies the products and system conforming to domestic standards and specifications, integrates control systems including the field instruments, and supplies the instrumentation/control equipment and systems for ship and marine applications while providing the instrumentation products and solutions for natural gas, control valve inspection, water pressure/leakage tests and operation tests. Moreover, Emerson Process Management provides various products and services of Emerson, including PlantWeb and Asset Optimization solution, and whole products and services of Emerson Process Management.

DSME developed a LNG cargo containment system with the world's best performance

DSME proved its technological prowess in LNG sector, securing itself an advantageous position in winning new orders

Daewoo Shipbuilding & Marine Engineering (DSME) announced on October 26 that it successfully developed 'SOLIDUS', the cargo containment system with the lowest LNG boil-off rate compare to that of existing LNG cargo containment systems. In particular, Lloyd's Register (LR) granted the design general approval for SOLIDUS applicable to all LNG carriers and LNG cargo containment system in recognition of the excellence of the technology.

SOLIDUS is a next-generation membrane type cargo containment system which adopted the double metal barrier incorporating only domestic technology to maximize safety. DSME applied eco-friendly and high-performance insulation materials to SOLIDUS through cooperation with BASF, a Germany-based chemical company. As a result, SOLIDUS is expected to drastically reduce daily LNG boil-off rate to 0.05% from 0.07% which has been considered as the limit of existing cargo containment systems. The difference will be translated into the volumes of LNG worth about KRW 500 million per year, carried by 170,000m^3 NG carrier.

Thus, DSME will retain the world's best technologies in the field of cargo containment system, such as active boil-off control using LNG reliquefaction system that it already developed and manual boil-off control using the SOLIDUS. SOLIDUS simplified the connection between primary barrier and secondary barrier in the cargo containment system, which is considered to provide greater efficiency than existing systems in terms of cost and quantity of component parts required. Particularly, DSME worked closely with domestic LNG-related manufacturers in connection with development of SOLIDUS, raising the expectation for greater localization in related industries.

Life-size model of SOLIDUS, a LNG cargo containment system developed by DSME

An official from DSME said, "Using its world's best gas carrier construction capability, DSME successfully developed the system with the lowest daily LNG boil-off rate in LNG sector, creating a new value dominating the market."

Besides, DSME has set a record of delivering the world's fist FLNG, LNG-FSRU, ice-breaking LNG carrier, direct-injection type LNG carrier, etc. Moreover, DSME has world's unmatched technologies across LNG-related sectors in shipbuilding industry, such as high manganese steel stand-alone LNG fuel tank developed jointly with POSCO.

DSME has maintained the world's most extensive records in LNG carrier order intake and largest order backlog of LNG carriers among shipyards around the globe since it received its first LNG carrier order in 1992. So far, DSME has successfully delivered 108 LNG carriers out of 153 units ordered to it and has an order backlog of 45 LNG carriers, the largest in the world.

DSME will hold a demonstration session on SOLIDUS for ship owners from December as part of efforts to add fresh momentum to its sales activities.

SHI put to sea the world's largest Egina FPSO with a storage capacity of 2.3 million barrels!

Egina FPSO worth USD 3 billion, the world's largest offshore facility, is scheduled for final delivery to the client after completion of processes using local contents in Nigeria.

The world's largest Egina FPSO (Floating Production Storage and Offloading), built by Samsung Heavy Industries (SHI), successfully completed construction process and left Geoje shipyard for Nigeria on October 31.

SHI put to sea the Ichthys CPF, the world's largest floating gas processing facility, and Prelude FLNG, the world's largest floating LNG production facility, last April and June, respectively, thus completing delivery (including departure from port) of 3 ultra-large offshore projects as scheduled.

Egina FPSO is an offshore project awarded to SHI in 2013 from Nigeria. The bidding process alone took 5 years after pre-qualification process that began in 2009. It was an ultra-large project for which bidders competed fiercely until the final award. This FPSO will be deployed in Egina offshore oilfield located 200 kilometers off the coast of Nigeria. It is an ultra-large offshore facility measuring 330m in length, 61m in width, and 34m in height with the topsides weighing 60,000 tons and has a storage capacity of 2.3 million barrels.

Egina FPSO project was awarded to SHI in an approximately USD 3 billion worth of turnkey contract encompassing design, procurement, production, transportation, commissioning, etc. It represents the largest single contract for FPSO to date. Egina FPSO project required production, installation and commissioning of part of topsides in Nigeria based on local content requirements (pursuant to local production regulations). As a result, Egina FPSO which departed from SHI's Geoje shipyard will arrive in Nigeria after about 3 months of voyage and will be delivered to the client in the second half of 2018 after completion of installation and commissioning of plant modules produced in Nigeria.

'Egina FPSO' departing from the port for Nigeria

To cope with local content requirements, SHI completed a production base in October 2016 in Lagos, Nigeria in partnership with local companies. The local production base was built on a land covering an area of about 120,000m^2 and has an assembly plant, a painting factory, and a 500-meter-long quay wall facility for berthing of FPSO. SHI has built the topside plant modules to be mounted on Egina FPSO at this production base since June 2015. The modules have been successfully produced under the safety and quality standards same as those of Geoje shipyard, and the processes using local contents have been proceeding as scheduled without disruption.

An official from SHI said, "We have successfully completed domestic production process for Egina FPSO based on close cooperation with the client and rigorous safety and quality control. As we have thoroughly prepared, we expect that the construction process using local contents in Nigeria will be completed successfully."

Maersk Line named 'Container Operator of the Year'

Throughout 2017, Maersk Line has introduced several improvements to its services and product offering.

Maersk Line has been named 'Container Operator of the Year' at the annual Lloyd's List Asia awards in Singapore. Maersk Line received the award for continuous network advancements, market leading digital solutions and trade finance, which allows customers to expand their business and reach new markets.

Collecting the award on behalf of Maersk Line, Mr. Rupesh Jain, Maersk Line's South East Asia Managing Director said "I am very honoured to accept this award on behalf of the Maersk Line. It is the recognition of the continued support we have seen from our customers and peers during a challenging time for Maersk Line, it is also great to take this back to our employees who really deserve this award."

"Maersk Line's commitment to market leadership goes beyond the number of vessels in our fleet. Our highest priority is being the customer's preferred container operator so we work hard to develop a network and provide services that resonates with our customers" said Mr. Jain, Maersk Line's South East Asia Managing Director.

Throughout 2017, Maersk Line has introduced several improvements to its services and product offering. On the Asia-North Europe trade, Maersk Line established another service, improving the transit time for shippers. New services have also been established between Asia and the US East Coast and Asia and West Africa.

Rupesh Jain, Maersk Line's South East Asia Managing Director (center) and Equatorial Marine President

Trade Finance is another way Maersk Line is leading the industry and making shipping easier and more accessible for customers. Available in Singapore, India, Spain, the Netherlands, the USA and the UAE, Maersk Line is offering local customers easy access to capital at a lower cost for their global shipments, offering a single window to manage the flow of goods and the flow of capital to our customers.

Maersk Line's industry leadership in the field of innovation was also noted, in particular for Remote Container Management and blockchain technologies. In Q3 2017 Maersk Line became the first shipping company to address reefer customers' need for greater cargo visibility by giving real time data about the state of their cargo including location, temperature, humidity and other conditions. The data is valuable for our customers to understand and optimise their supply chains. When needed, Maersk and our customers can jointly plan contingencies to reduce wastage and costs.

Not only is RCM beneficial for our customers, but in the current tough market conditions, RCM is good business practice. In 2017 YTD we have detected more than 4500 instances of incorrect reefer setting. In more than 200 of these cases the cargo – collectively worth several millions to our customers – would have been lost without correcting the settings.

ABB acquires Tekomar and extends its ABB Ability™ digital offering

ABB to offer digital engine performance monitoring solution

ABB Turbo Systems Ltd. has signed an agreement to acquire Tekomar Group Ltd. headquartered in Winterthur, Switzerland. ABB will further develop Tekomar's digital solution for engine analytics and advisory systems enabling better performance for marine customers. Advancing ABB capabilities in performance modelling and analysis, this acquisition will also further extend the group's ABB Ability™ portfolio of digital products and services. The transaction is expected to be closed during Q4 2017.

With this acquisition, ABB extends its digital portfolio with a propulsion performance monitoring solution targeted at two-stroke main engines and auxiliary engine applications. The solution will be integrated into ABB's established vessel optimization system, further enabling ship management companies to know more about their vessel operations and achieve more from their fleets for better business performance. It also offers a platform for cooperation with the engine licensors and builders.

Proven in the field, the operators of over 1,000 ships are already benefiting from this performance monitoring and advisory solution. It provides operators with recommendations for achieving optimized and original levels of engine performance. With this expertise from Tekomar, ABB is further advancing its marine industry and vessel operations experience to enhance value for customers.

Oliver Riemenschneider, Managing Director, ABB Turbocharging explained, "This acquisition is exactly the right fit with the existing strengths and capabilities of ABB in the marine industry, and with our strategic vision for developing value-driven digital solutions. As a global market player, ABB is perfectly positioned to bring to the highly globalized and demanding marine market a holistic digital solution for vessel and ship management. Tekomar's solution is proven, well-established and a valuable extension to our existing solutions. Our goal is to further empower customers to achieve the benefits of improved performance, reduced fuel consumption, and lower emissions, together with ABB."

Juha Koskela, Managing Director, ABB Marine & Ports added, "This newly acquired solution from Tekomar rapidly increases the pace at which ABB strengthens its digital marine services portfolio. We are a key part of this digital industry transformation which brings true connectivity of vessels, measurement and monitoring, advanced solutions and powerful software for real actionable insights. What our customers gain from these next level solutions is increased productivity, driving their future profitability and competitive strength."

Beat Güttinger, Tekomar co-founder and Head of Global Sales & Marketing, commented on the acquisition, "The market reach of ABB and its heritage as an industrial market leader makes this a natural step for taking our Tekomar XPERT solution forward globally. As the marine industry embraces the opportunities of digitalization for all aspects of optimization and performance improvement, this is an exciting time for the advancement of our solutions. We are looking forward to realizing what Tekomar and ABB can do together."

Bureau Veritas meets industry needs with the release of new rules for FSRUs

Provision made for 'pure' FSRUs and units needing flexibility to trade as LNG carriers

Bureau Veritas has now published a new Rule (NR645) for the classification of Floating Storage and Regasification Units (FSRUs) in response to industry demand and following close engagement with FSRU stakeholders.

Demand for FSRUs is growing. They are a fast, cost effective route to meet growing demand for LNG as a clean and cost competitive energy source. The new BV rules enable the classification of all types of floating storage and regasification assets in a comprehensive and pragmatic manner by building on Bureau Veritas' extensive experience in the LNG sector.

The new rules set out technical requirements to address the technical and operational issues of FSRUs. These requirements span demand for units that may operate as a floating terminal for one or more decades to FSRUs that may be required for much shorter periods and whose operators may want the option of trading as an LNG carrier.

The rules address this range of needs while applying a unified approach to safety and design challenges and providing clarity in terms of classification requirements by offering two distinct class notations:

Liquefied Gas Carrier - FSRU notation - Based on rules for the classification of LNG carriers this enables gas trading in addition to floating storage and regasification terminal operations. The notation provides the possibility for exemptions from the traditional class survey regime - such as five year dry-docking survey requirements - when the vessel is in use as an FSRU.


FSRU Experience, Courtesy of Exmar

FSRU notation - For units dedicated to pure gas storage and regasification terminal operations and not intending to trade. This notation provides full optimization for site conditions and a class survey regime as applicable to permanent units with continuous operation requirements. No dry-docking would be required and some exemptions from IGC Code requirements compared to typical LNG carriers are allowed. For example, no bottom damage stability requirements would be necessary having addressed specific operational circumstances.

Jean-François Segretain, Marine Technical Director, Bureau Veritas, commenting on the new rules said "FSRUs are a special market with both 'marine' and 'offshore' approaches and requirements involved. So, FSRU projects raise a lot of questions from all stakeholders. These new rules take into account the specific technical, regulatory, operational and environmental requirements of FSRU stakeholders to provide a much higher level of confidence when making significant commercial decisions."

With a growing demand across the gas supply chain, Bureau Veritas specialists are involved in a wide range of LNG projects world-wide, including a growing number of FSRUs, small-scale LNG projects, LNG as fuel projects (BV is the class leader in LNG fuelled newbuildings) and LNG carriers including the 15 Yamal ice-class ships.

대우조선해양, 세계 최고 성능 LNG 화물창 독자 개발

대우조선해양이 LNG 분야에서의 우수한 기술력을 과시하며, 향후 수주전에서 유리한 고지를 선점했다.

대우조선해양은 현존하는 LNG 화물창 중 자연 기화되는 LNG 비율이 가장 낮은 화물창 시스템인 '솔리더스(SOLIDUS)'를 독자 개발에 성공했다고 지난 10월 26일 밝혔다. 특히 영국의 로이드(LR)로부터 모든 LNG 운반선과 LNG 화물창에 적용 가능한 조건 없는 설계 승인(General Approval)을 획득함으로써 그 기술력을 인정받았다.

솔리더스는 국내 기술만으로 이중 금속 방벽을 적용해 안전성을 극대화한 차세대 멤브레인형 화물창으로, 대우조선해양은 독일의 화학회사인 BASF와의 협력을 통해 친환경적이고 고성능의 단열재를 개발해 적용했다. 이로 인해 그 동안 한계치라고 여겨지던 기존 화물창의 일일 LNG 증발률 0.07%에서 0.05%대로 획기적으로 증발률을 낮출 수 있을 것으로 예상된다. 이 차이는 170,000㎥급 LNG 운반선을 운행한다는 가정 하에 연간 약 5억원 상당의 LNG를 소모 없이 더 운송할 수 있다.

대우조선해양은 이미 개발한 LNG 재액화 장치를 이용한 능동 증발량 제어 및 솔리더스를 이용한 수동 증발량 제어 등 화물창 성능 분야에서 최고의 기술력을 보유하게 됐다. 또한, 화물창의 일차방벽과 이차방벽의 연결부를 간소화하여 비용과 부품수 면에서 기존 시스템보다 효율성이 뛰어난 것으로 평가된다. 특히 이번 솔리더스 개발과 관련해 국내 LNG 관련 기자재 업체를 최대한 활용함으로써 관련 산업의 국산화에 크게 이바지할 수 있을 것으로 기대하고 있다.

대우조선해양이 개발한 LNG 화물창 '솔리더스'의 실물 모형

대우조선해양 관계자는 "최고 수준의 가스선 건조능력을 보유한 대우조선해양이 LNG 사업 분야에서 최저 일일 LNG 증발률을 갖는 시스템을 개발함으로써 시장 지배적인 새로운 가치를 창출해냈다"고 말했다.

대우조선해양은 이외에도 FLNG, LNG-FSRU, 쇄빙 LNG 운반선, 천연가스 직분사 추진방식 LNG 운반선 등을 세계 최초로 인도한 기록을 보유하고 있으며, 포스코와 고망간강 독립형 LNG 연료탱크 개발 등 조선업계에서 LNG와 관련된 거의 모든 분야에서 독보적인 기술력을 보유하고 있다.

대우조선해양은 1992년 처음으로 LNG 운반선을 수주한 이후 현재까지 전세계 조선소 중 가장 많은 LNG 운반선 수주실적과 수주잔량을 보유하고 있다. 지금까지 모두 153척의 LNG 운반선을 수주해 108척을 성공적으로 인도했으며, 현재 세계에서 가장 많은 45척의 수주잔량을 보유하고 있다.

한편 대우조선해양은 오는 12월부터 선주들을 대상으로 솔리더스에 대한 시연회를 갖는 등 영업활동에 박차를 가할 예정이다.

삼성중공업, 저장용량 230만 배럴 세계 최대 '에지나 FPSO' 출항!

30억 달러 규모 세계 최대 해양설비인 에지나 FPSO가 나이지리아 현지에서 로컬 컨텐츠 공정을 마친 뒤 선주사에 최종 인도될 예정이다.

삼성중공업이 건조한 세계 최대 규모의 부유식 원유생산 저장 및 하역설비인 에지나(Egina) FPSO(Floating Production Storage and Offloading)가 거제조선소에서의 공정을 성공적으로 마무리하고 지난 10월 31일 나이지리아로 출항했다.

삼성중공업은 세계 최대 부유식 가스처리 설비인 '익시스(Ichthys) CPF'와 세계 최대 부유식 LNG 생산설비 '프렐류드(Prelude) FLNG'를 올해 4월과 6월에 출항시킴으로써, 올해 예정됐던 초대형 해양 프로젝트 3건의 인도(출항 포함)를 모두 완료했다.

에지나 FPSO는 삼성중공업이 지난 2013년에 나이지리아에서 수주한 해양프로젝트로서 지난 2009년 사전 자격심사를 시작으로 입찰 기간만 5년에 달했으며, 그만큼 치열한 수주전이 펼쳐졌던 초대형 프로젝트였다. 나이지리아 연안에서 200km 떨어진 에지나 해상유전에 투입되는 이 FPSO는 길이 330m, 폭 61m, 높이 34m 크기로 저장용량 230만 배럴에 상부플랜트(Topside) 중량만 60,000톤에 달하는 초대형 해양설비다.

삼성중공업이 설계와 구매, 제작, 운송, 시운전 등을 총괄하는 턴키 방식으로 수주한 이 프로젝트의 계약 금액은 약 30억 달러로 FPSO 사상 최대 수주 금액으로 기록된 바 있다.

나이지리아를 향해 출항하는 '에지나 FPSO'

에지나 FPSO는 로컬 컨텐츠(Local Contents, 현지 생산 규정)에 따라 나이지리아 현지에서 FPSO 상부플랜트의 일부를 제작, 탑재하고 시운전 등을 수행해야 하는 프로젝트였다. 이에 따라, 삼성중공업 거제조선소를 출항한 에지나 FPSO는 약 3개월의 항해를 거쳐 나이지리아에 도착 후, 현지에서 생산한 플랜트 모듈 탑재와 시운전 등을 마친 뒤인 2018년 하반기 발주처에 인도될 예정이다.

삼성중공업은 로컬 컨텐츠에 대응하기 위해 현지업체와 합작으로 나이지리아 라고스(Lagos) 지역에 생산거점을 건설(2016년 10월 완공)했다. 현지 생산거점은 면적 약 120,000㎡ 규모로 조립 공장과 도장 공장, FPSO가 접안할 수 있는 500m 길이의 안벽시설 등을 갖추고 있다.

삼성중공업은 2015년 6월부터 이 곳에서 에지나 FPSO에 탑재할 상부 플랜트 모듈을 제작해 왔음. 해당 모듈은 거제조선소와 동일한 안전 및 품질 기준 하에 성공적으로 제작되고 있는 등 로컬 컨텐츠 건조 작업은 당초 계획대로 순조롭게 진행 중이다.

삼성중공업 관계자는 "발주처와의 긴밀한 협력과 철저한 안전 및 품질 관리를 바탕으로 에지나 FPSO의 국내 공정을 성공적으로 마무리했다"면서 "사전에 철저히 준비해 온 만큼 나이지리아 로컬 컨텐츠도 성공적으로 수행할 것으로 기대한다"고 설명했다.

머스크라인, '올해의 컨테이너 선사' 수상

세계 1위 해운선사인 머스크라인은 글로벌 해운시장의 악화에도 불구하고, 올해 비즈니스 서비스 및 제품에 있어 성장을 거듭하고 있다.

머스크라인은 세계적인 조선해운 전문지인 '로이드 리스트'가 지난 10월 26일 싱가포르서 개최한 '로이드 리스트 아시아 어워드 2017'에서 '올해의 컨테이너 선사'로 선정, 지속된 네트워크 발전·디지털화 및 무역금융 선도로 고객들의 사업을 확대하며 신규 시장 진입을 가능토록 기여한 바를 인정받았다고 밝혔다.

시상식에 참석한 루페쉬 제인(Rupesh Jain) 머스크라인 동남아시아 지역 사장은 "머스크라인을 대표해 이 상을 수여 받게 되어서 매우 영광"이라며, "어려운 시간 동안 머스크라인을 지지해 준 고객과 동료들의 끊임없는 성원에 힘입은 결과인 만큼, 상을 받기에 부족함 없는 임직원들에게 상을 들고 돌아가게 되어 매우 기쁘다"라고 전했다. 덧붙여 그는 "머스크라인은 시장 선도에 대한 약속을 지키고자 총력을 기울이고 있다"며 "머스크라인의 최우선 가치는 고객이 가장 선호하는 선사가 되는 것으로, 고객의 필요에 부합하는 네트워크를 구축하고 서비스를 제공하기 위한 노력을 이어갈 것"이라고 말했다.

머스크라인은 2017년 전반에 걸쳐 서비스와 제품에 있어서 발전을 거듭했다. 그 중 아시아-북유럽간 교역에서는 새로운 서비스를 개발해 수송시간을 대폭 향상시켰으며, 아시아-북미 동안 및 아시아-서아프리카 노선에서도 새로운 서비스를 개발 및 운영 중에 있다.

또한 무역금융을 통해 해운 산업을 주도하는 동시에 고객들이 해운 서비스에 보다 쉽고 빠르게 접근할 수 있도록 지원하고 있다. 머스크라인의 무역금융은 현재 싱가포르, 인도, 스페인, 네덜란드, 미국 및 아랍에미리트(UAE)에서 제공되고 있으며, 현지 고객들에게 빠른 자본 조달 및 신속·간단한 과정을 통해 신뢰할 수 있는 운/수송 서비스와 더불어 글로벌 시장으로의 확대에 기여함으로써 고객들이 상품과 자본의 흐름을 한 번에 관리할 수 있는 창구로 활용되고 있다.

루페쉬 제인(Rupesh Jain) 머스크라인 동남아시아 지역 사장(중앙)

머스크라인은 이번 수상과 더불어 원격화물관리(RCM) 시스템 및 블록체인 도입으로 해운의 디지털화를 선도하는 업계 리더십을 인정받았다. 머스크라인은 높은 화물 가시성에 대한 고객 필요에 대응하고자 2017년 3분기를 기점, 업계 최초로 냉장 컨테이너 고객들에게 실시간으로 컨테이너의 위치·온도·습도 등의 정보를 제공하고 있다. 해당 정보는 고객들이 공급망에 대해 이해하고 이를 최적화 시키는 데 매우 중요하며, 필요한 경우 머스크라인과 자사 고객들이 공동으로 낭비 및 비용을 절감할 비상대책을 마련할 수 있다.

원격화물관리 시스템은 고객들뿐 아니라 현재 어려운 시장상황에서 좋은 경영 사례가 된다. 머스크는 2017년부로 4,500건 이상의 냉장선 온도 설정 오류를 감지, 수정해 최상의 화물 상태를 보존한 바 있으며, 이 중 200개 이상의 오류가 수정되지 않았더라면 수십억 원에 이르는 고객 화물 손실이 발생했을 것으로 나타났다.

머스크라인은 또한 IBM과 협업으로 블록체인을 도입, 전 세계를 잇는 디지털 교역 네트워크를 구축했다. OECD에 따르면 현재 세계 무역으로 거래되는 상품 가치 전체의 15%가 간접비용으로, 연간 1,000억 달러에 달하는 비용이 대부분 교역에서 이루어지는 수동 프로세스로 인해 발생하는 것으로 추산된다. 해당 네트워크는 실시간으로 공급체인에서 발생하는 일과 서류 등을 교환할 수 있게 한다. 블록체인을 통해 고객들은 문서작업을 단순화함으로써 비용을 줄일 수 있고, 서류들은 디지털화 되어 위조가 불가능하며 세계 곳곳의 중소기업은 물론 신흥경제국에도 폭넓은 상품을 공급할 것으로 전망된다.

국내 조선업계 2017년 신조선 수주량, 수주금액 1위 유지

국내 조선업계는 상반기 중에 수주 절벽을 보였던 Container 선박의 수주가 8월에 부산소재 대선조선이 1,011TEU Feeder Container Ships 6척을 척당 약 USD18.6 Million에 수주에 이어 9월 22,000TEU Mega Container Ship 17척을 척당 약 USD 164 Million에 수주와 14,000TEU Container Ship 10척을 USD 105 Million에 수주 함으로서 지난 8월 프랑스의 CMA CGM사의 22,000TEU Container Ships 9척(6+3option)을 척당 약 USD 155 Million에 중국 SWS – Hudong Zhonghua 조선소에 넘겨준 수모를 만회하면서 9월말 현재 2017년 신조선 수주량과 수주금액 1위를 유지했다.

더불어 국내 조선산업은 다가올 수주경쟁에서 우위를 점하기 위해서는 금융제공의 여력이 뒷받침 되야 할 것으로 보인다. 한국수출입은행에서 발표한 "선박금융시장과 동향"에서는 극심한 침체를 보이고 있는 신조선 시장은 2018년을 전후로 회복될 것으로 전망된다고 밝히고 있다.

이유로는 현재의 극심한 침체 현상이 선박 수요가 없기 때문이 아니라 신조선 투자가 유예되고 있는 것으로 추정되고 있기 때문인데, 이제부터 발주되는 신조선박이 SOx 규제 등 강화되는 해상환경규제를 충족시켜야 하기 때문에, 우선적으로 연료의 선택이 아직 어려운 상황이다. 또한, 운임과 용선료의 하락으로 선주들의 재무상황이 여유가 없어 최대한 투자를 미루어야 하는 실정인 것이다. 반면, 중고선 거래가 활발하게 이루어지고 있는데, 이는 신조선 시황의 회복이 임박했음을 반증하는 것으로 보고 있다.

따라서 2018년부터 발주되는 신조선 수주 확보를 위해서는 국가적으로 금융을 뒷받침 할 수 있어야 한다고 밝히고 있는데, 신조선 발주 선주들은 자국이나 유럽 금융권에서 충분한 투자와 대출을 받기 어려울 것으로 예상하고 있기 때문이다.

이로 인해 이들 선주들의 금융 부족분의 보완책으로 국내 금융 기관에 금융제공 요청이 증가할 것으로 전망되고 있고, 얼마나 많은 금융을 국내에서 제공할 수 있을 지의 결과에 따라 국내 조선산업의 회복 정도가 좌우될 수 도 있다고 판단하고 있다. 만약 국내에서 부족한 금융을 조달하는데 실패하게 되면 선주들은 금융제공 여력이 높은 일본이나 중국으로 발주처를 변경할 수 있기 때문이다. 금융의 조달 여건은 조선산업뿐 아니라 국내 해운산업의 경쟁력 강화를 위해서도 절실한 상황으로, 정부의 역할이 매우 중요한 시점이다.

국내 조선산업 신조선 추정 수주 현황

세계 조선소, 선주사, 리서치기관, Shipbrokers 및 국내외 언론의 보도 자료 등을 종합한 국내 조선산업의 2017년 9월 30일 기준 신조선 추정 수주 현황을 보면 옵션을 포함하여 총 296척 중 Gas Carrier 23척(2,121,300 CBM), Tanker Carrier 202척(31,181,400 DWT), Bulker Carrier 22척(6,170,000 DWT), Container Ship 31척(492,066 TEU), Other vessels 18척을 수주한 것으로 나타나고 있으며 이는 2016년 동기간 92척 대비 296척으로 3배 이상 증가한 것으로 추정되고 있다.(그림 1 참조)

2017년 3분기 신조선 수주는 123척으로 2016년 41척 대비 3배 증가한 것으로 나타나고 2015년 104척 대비 약 20% 증가했으며

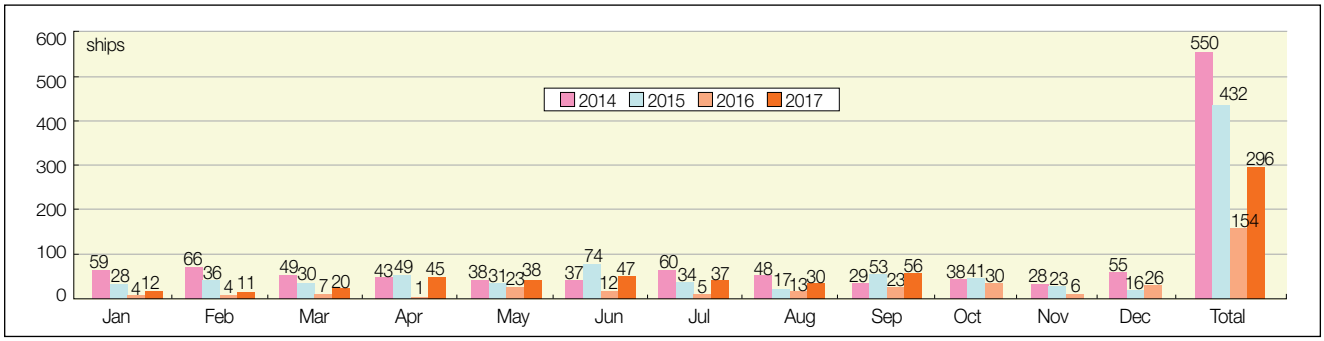


그림 1. 국내 조선소 2014–2016년 대비 2017년 추정 수주현황 추이 (옵션 포함)

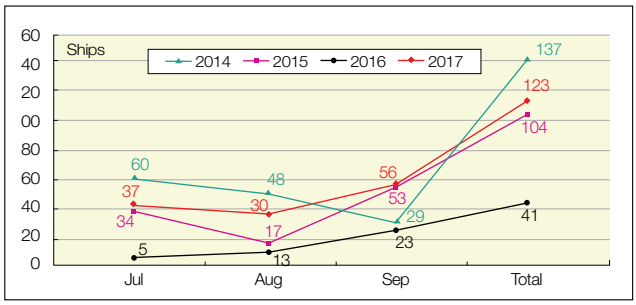


그림 2. 국내 조선소 2014–2016년 3분기 대비 2017년 추정 수주현황 추이 (옵션포함)

2014년 137척 대비 약 90% 수준으로 나타나고 있다.(그림 2 참조)

월별 수주 현황을 보면 1월은 Tanker Carrier 12척(1,394,000 DWT) 수주, 2월은 11척 중 Gas Carrier 4척(84,000 CBM), Tanker Carrier 5척(750,000 DWT), 18,000dwt Ro–Ro vessels 2척을 수주, 3월은 20척 중 Gas Carrier 8척(994,300 CBM), Tanker Carrier 14척(2,795,700 DWT) 수주, 4월은 45척 중 Gas Carrier 2척(15,000 CBM), Tanker Carrier 42척(7,960,300 DWT), Other vessels 1척 수주, 5월은 38척 중 Gas Carrier 1척(38,000 CBM), Tanker Carrier 37척(6,855,000 DWT) 수주, 6월은 47척 중 Gas Carrier 2척(360,000 CBM), Tanker Carrier 28척(2,726,000 DWT), Bulker Carrier 3척(975,000 DWT), Other vessels 14척 수주, 7월은 Tanker Carrier 37척(4,040,400DWT) 수주, 8월에는 Gas Carrier 8척(672,000 CBM), Tanker Carrier 11척(542,000 DWT), Bulker Carrier 4척(320,000 DWT), Container Ship 6척(6,066 TEU), Other vessels 1척 수주, 9월에는 Tanker Carrier 16척(4,118,000 DWT), Bulker Carrier 15척(4,875,000 DWT), Container Ship 25척(486,000 TEU)을 수주한 것으로 집계됐다. 올해 들어 Container Ship 6척을 첫 수주한 것으로 집계됐다.(표 1~2 참조)

2017년 9월 30일 추정 수주금액을 보면 총 US$ 19,058.3 Million 중 Gas Carrier US$ 2,390.8 Million, Tanker Carrier US$ 10,517 Million, Bulker Carrier US$ 1,545 Million, Container Ship US$ 3,748.90 Million, , Other vessels US$ 855.8 Million으로 나타나고 있으며 월별 수주금액을 보면 1월 US$ 545.7 Million, 2월 US$ 533 Million, 3월 US$ 2,013.3 Million, 4월 US$ 2,449 Million, 5월 US$ 2,138.9 Million, 6월 US$ 2,563.8 Million, 7월 US$ 1,560 Million, 8월 US$ 1,356.3 Million, 9월은 US$ 5,978.3 Million 중 Tanker Carrier US$ 1,141 Million, Bulker Carrier US$ 1,200 Million, Container Ship US$ 3,637.3 Million으로 나타났다.(표 3 참조)

Division	Gas	Tanker	Bulker	Container	Other	Monthly Total
January		12				12
February	4	5			2	11
March	6	14				20
April	2	42			1	45
May	1	37				38
June	2	28	3		14	47
July		37				37
August	8	11	4	6	1	30
September	0	16	15	25	0	56
Total	23	202	22	31	18	296

표 1. 국내 조선소 선종별 수주현황 (옵션 포함 – 2017년 8월 31일 기준)

Division	Gas (CBM/m³)	Tank (DWT)	Bulk (DWT)	Container (TEU)
January		1,394,000		
February	84,000	750,000		
March	952,300	2,795,700		
April	15,000	7,960,300		
May	38,000	6,855,000		
June	360,000	2,726,000	975,000	
July		4,040,400		
August	672,000	542,000	320,000	6,066
September		4,118,000	4,875,000	486,000
Total	2,121,300	31,181,400	6,170,000	492,066

표 2. 국내 조선소 선종별 수주량 추이 (옵션 포함 – 2017년 8월 31일 기준)

Division	Gas	Tanker	Bulker	Container	Other	Monthly Total
January	–	545.70	–	–	–	545.70
February	160.00	254.00	–	–	119.00	533.00
March	1,105.30	828.00	–	–	–	1,933.30
April	80.00	2,339.00	–	–	30.00	2,449.00
May	45.50	2,093.40	–	–	–	2,138.90
June	400.00	1,292.00	225.00	–	646.80	2,563.80
July	–	1,560.00	–	–	–	1,560.00
August	600.00	464.70	120.00	111.60	60.00	1,356.30
September		1,141.00	1,200.00	3,637.30		5,978.30
Total	2,390.80	10,517.80	1,545.00	3,748.90	855.80	19,058.30

표 3. 국내 조선소 2017년 월별 추정 수주금액 (옵션 포함 / Unit: US$–Million)

Division	Gas Carrier	Tanker Carrier	Bulker Carrier	Container Ships	Other ves–sels	Shipyard Total
HHI	13	43	3	8		67
DSME	4	29		11		44
SHI	2	21		6		29
HMD	4	49	4		5	62
HSHI		20				20
STX O&S		20				20
Sungdong		7				7
HHIC		10			12	22
DaeHan		16				16
DaeSun		2		6		8
Other Yard					1	1
Ships Total	23	217	7	31	18	296

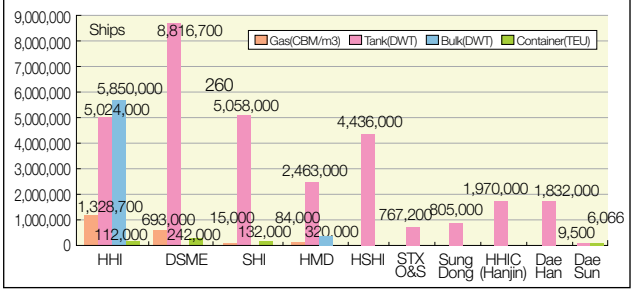


표 4. 국내 조선업체 선종별 수주현황 (신조선 옵션포함 – 2017년 8월 31일 기준)

Shipyard	Date	Client	Country	Class of Order	Q'TY	Delivery
HSHI	Sep	BoCom FL	China	157,000dwt Tanker Carrier	4	2019
SHI	Sep	Statoil ASA	Norway	155,000dwt Tanker Carrier	2	2019~20
SHI	Sep	MSC	Italy	22,000TEU Mega Container Ship	6	2019
DSME	Sep	Hyundai Merchant Marine	Korea	318,000dwt Tanker Carrier(5+5option)	10	2019
DSME	Sep	MSC	Italy	22,000TEU Mega Container Ship(5+6option)	11	2019~20
HHI	Sep	Polaris Shipping	Korea	325,000dwt VLOC Bulker Carrier(10+5option)	15	2019
HHI	Sep	Eastern pacific(EPS)	Singapore	14,000TEU Container Ship(4+4option)	8	2020
Total By Volume of 2017					296 ships	

표 5. 2017년 8월 한국 주요 조선소 추정 신조선 수주현황 (신조선 옵션포함 – 2017년 9월 30일 기준) ※ HHI: 현대중공업, DSME: 대우조선해양, SHI: 삼성중공업, HSHI: 현대삼호중공업, HMD: 현대미포조선, HHIC: 한진중공업, Sungdong: 성동조선해양, Daesun: 대선조선, Daehan: 대한조선, Dongsung: 동성중공업

Shipyard	Date	Client	Country	Class of Order	Q'TY	Delivery
SHI	Oct	Marubeni–Sojitz –Pertamina consortium	Indonesia	170,000㎥ LNG–FSRU	SHI	2020
Total By Offshore Rig					19 Rig	

표 6. 2017년 10월 국내 조선소 해양플랜트(Offshore Rig) 추정 수주 현황

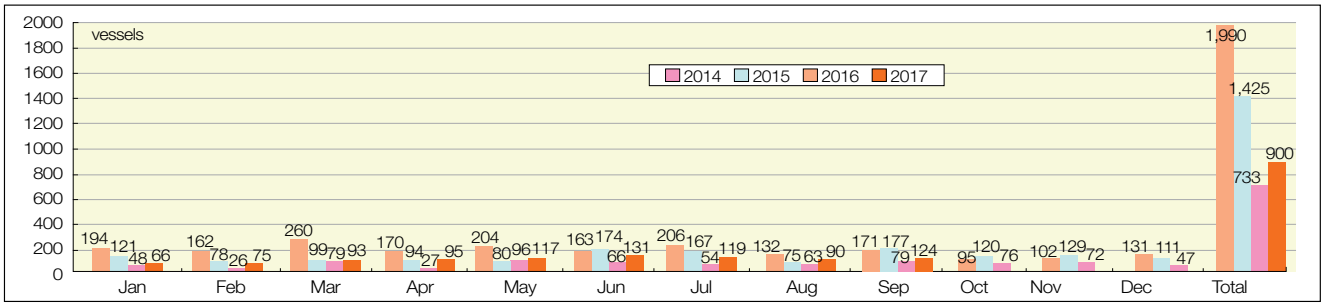


그림 3. 세계 조선소 2014~2016년 대비 2017년 추정 수주현황 추이

2017년 8월 국내 신조선 추정 수주 현황

국내 조선 업체별 2017년 8월 신조선 추정 수주 현황을 보면 현대중공업은 국내 선사인 Polaris Shipping으로부터 325,000dwt VLOC Bulker Carrier 15척(10+5option)을 척당 선가 약 USD 80 Million에 수주와 Singapore의 Eastern pacific(EPS)사로부터 14,000TEU Container Ship 8척(4+4option)을 척당 선가 약 USD 105 Million에 수주했다.

대우조선해양은 국내 선사인 현대상선(HMM)으로부터 318,000dwt Tanker Carrier 10척(5+5option)을 척당 선가 약 USD 83.5 Million에 수주와 유럽의 대형 선사인 MSC사로부터 22,000TEU Mega Container Ship 11척(5+6option)을 척당 선가 약 USD 163.4 Million에 수주했다.

삼성중공업은 Norway의 Statoil ASA사로부터 155,000dwt Tanker Carrier 2척과 유럽의 대형 선사인 MSC사로부터 22,000TEU Mega Container Ship 6척을 수주했다. 현대삼호중공업은 중국의 BoCom FL로부터 157,000dwt Tanker Carrier 4척을 척당 선가 약 USD 51.5 Million에 수주했다.(표 4~5)

2017년 국내 조선소 해양플랜트 추정 수주 현황

2017년 10월 20일 기준 해양플랜트(Offshore Rig) 추정 수주현황을 보면 2016년 1월에는 수주소식이 전무했으나 2017년 1월에는 6기(3+3option), 2월 10기(2+8option), 6월 1기, 8월 1기 수주로 총 18기(7+11option)를 수주한 것으로 집계됐다. 10월 들어 삼성중공업이 2,500억원 규모의 17만㎥급 LNG–FSRU(Floating Storage and Regasification Unit, 부유식 액화천연가스 저장 재기화 설비) 1척을 수주했다.

Division	Gas	Tanker	Bulker	Container	Other	Monthly Total
January	8	41	2	7	8	66
February	4	31	9	6	25	75
March	7	25	26	8	27	93
April	2	62	22	2	7	95
May	6	63	14	4	20	107
June	8	56	29	4	34	131
July	4	44	66	0	5	119
August	8	18	30	29	5	90
September	2	28	54	25	15	124
Total	49	368	252	85	146	900

표 7. 세계 조선소 2016년 선종별 수주 비교 (옵션 포함 – 2017년 9월 30일 기준)

세계 조선산업 2017년 신조선 추정 수주 현황

세계 조선소, 선주사, 리서치기관, Shipbrokers 및 국내외 언론의 보도 자료 등을 종합한 2017년 9월 30일 기준 세계 신조선 추정 수주현황을 보면 총 900척 Gas Carrier 49척(3,884,700 CBM),, Tanker Carrier 368척(50,393,050 DWT), Bulker Carrier 252척(29,308,950 000 DWT), Container Ship 85척(782,736 TEU), Other vessels 146척을 수주한 것으로 집계됐다.

2017년 9월 30일 기준 월별 추정 신조선 수주 현황을 보면 1월은

66척 중 Gas Carrier 8척(512,000 cbm), Tanker Carrier 41척(2,806,800 dwt), Bulker Carrier 2척(21,450 dwt), Container Ships 7척(12,400 teu), Other vessels 8척을 수주한 것으로 집계됐다.

9월은 124척 중 Gas Carrier 2척(10,000 CBM),, Tanker Carrier 28척(6,277,000 DWT), Bulker Carrier 54척(8,548,000 DWT), Container Ship 25척(486,000 TEU), Other vessels 15척을 수주한 것으로 집계됐다.(그림 2, 표 7~8 참조)

국가별 2017년 신조선 추정 수주 현황

2017년 9월 30일 기준 국가별 추정 신조선 수주현황을 보면 한국은 총 240척 중 Gas Carrier 23척(3,570,600 CBM), Tanker Carrier 186척(49,544,400 DWT), Bulker Carrier 7척(2,270,000 DWT), Container Ships 6척(6,066 TEU), Other vessels 18척을 수주했으며, 2017년 들어 8월에 첫 Container Ships 6척을 수주한 것으로 집계됐다.

2017년 9월 30일 기준 한중일 신조선 추정 수주금액(옵션 포함)을 보면 한국은 총 US$ 19,058.3 Million 중 1월 US$ 545.7 Million, 2월 US$ 533 Million, 3월 US$ 2,013.3 Million, 4월 US$ 2,449.00 Million, 5월 US$ 2,138.90 Million, 6월 US$ 2,563.8 Million, 7월 US$ 1,560 Million, 8월 US$ 1,356.3 Million, 9월 US$ 5,978.3 Million으로 나타나고 있다.

중국은 총 US$ 17,983.2Million 중 1월 US$ 1,627 Million, 2월 US$ 945 Million, 3월 US$ 3,186.4 Million, 4월 US$ 2,343.70 Million, 5월 US$ 1,380.90 Million, 6월 US$ 1,860 Million, 7월 US$ 2,813 Million, 8월 US$ 2,061.6 Million, 9월 US$ 1,765.6 Million으로 나타나고 있다.

일본은 총 US$ 2,215.5 Million 중 1월 US$ 34 Million, 2월 US$ 181.5 Million, 3월 US$ 141 Million, 4월 US$ 50 Million, 5월 US$ 61 Million, 6월 US$ 495 Million, 7월 US$ 56 Million, 8월 US$ 476 Million, 9월 US$ 721 Million으로 나타나고 있다.(표 11 참조)

Division	Gas	Tanker	Bulker	Container	Other	Monthly Total
S.Korea	23	202	22	31	18	296
China	16	142	178	38	52	426
Japan	5	15	44	4	5	73
Other	5	9	8	12	71	105
Ships Total	49	368	252	85	146	900

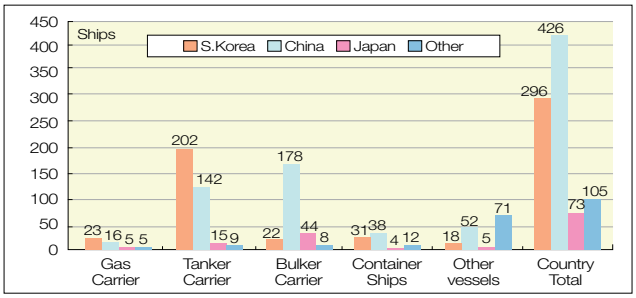


표 9. 국가별 2017년 선종별 수주현황
(Other vessels: Ferry, Cruise, Car carriers, RoPax, MPP, etc. – 2017년 9월 30일 기준)

Division	Gas(CBM/m³)	Tank(DWT)	Bulk(DWT)	Container(TEU)
January	512,000	2,838,300	31,450	12,400
February	84,000	2,885,300	541,000	12,900
March	959,800	3,274,700	2,806,000	8,050
April	15,000	11,627,500	3,212,000	920
May	75,500	12,195,000	806,000	10,100
June	860,400	5,961,000	4,068,000	14,400
July	696,000	4,564,400	6,358,000	0
August	672,000	769,850	2,938,500	237,966
September	10,000	6,277,000	8,548,000	486,000
Total	3,884,700	50,393,050	29,308,950	782,736

표 8. 세계 조선소 선종별 수주량 추이 (옵션 포함 – 2017년 9월 30일 기준)

2017년 8월말 기준 세계 조선소별 수주잔량 통계

영국 조선·해운 분석기관인 클락슨 World Shipyard Monitor 자료를 살펴보면, 야드별 수주잔량 30위권 안에 든 업체가 중국업체 14, 일본업체 9, 한국업체 5, 독일과 이탈리아업체가 각각 1개업체로 기존의 상황과 별다른 변동은 없는 것으로 나타나고 있다.

각 국가별로 수주잔량이 감소하고 있는 것 외에 특이점을 찾아보기 어려울 정도로 조선시장의 침체는 장기화 되고 있는 것이다. 2018년 서서히 회복될 것으로 전망 되고는 있지만, 아직 속단하기에는 이른 감이 있는 것도 사실이다.

Division	Gas(CBM/m³)	Tank(DWT)	Bulk(DWT)	Container(TEU)
S.Korea	2,121,300	31,181,400	6,170,000	492,066
China	1,544,000	15,984,350	18,355,950	248,470
Japan	181,900	2,625,800	3,525,000	7,600
Other	37,500	601,500	1,258,000	34,600
Total	3,884,700	50,393,050	29,308,950	782,736

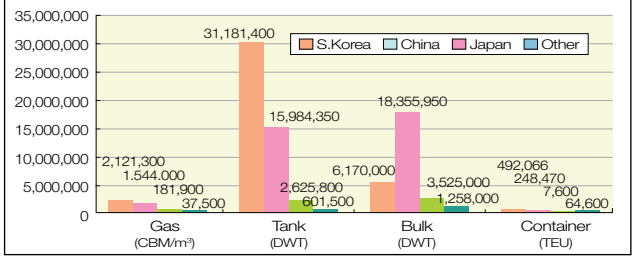


표10. 국가별 2017년 선종별 수주량 추이 (옵션 포함 – 2017년 9월 30일 기준)

Division	Korea	China	Japan	Monthly Total
January	545.70	1,627.00	34.00	2,206.70
February	533.00	945.00	181.50	1,659.50
March	1,933.30	3,186.40	141.00	5,260.70
April	2,449.00	2,343.70	50.00	4,842.70
May	2,138.90	1,380.90	61.00	3,580.80
June	2,563.80	1,860.00	495.00	4,918.80
July	1,560.00	2,813.00	56.00	4,429.00
August	1,356.30	2,061.60	476.00	3,893.90
September	5,978.30	1,765.60	721.00	8,464.90
Total	19,058.30	17,983.20	2,215.50	39,257.00

표 11. 2017년 월별 한중일 신조선 추정 수주금액 (옵션 포함-Unit: US$-Million)

본 자료는 세계 조선소, 선주사, 리서치기관, Shipbrokers 및 해외 언론의 보도 자료 등을 근거로 작성된 것으로, 타 자료와는 상이할 수 있습니다.

Creating Optimal LNG Storage Solutions

Liquefied natural gas (LNG) has taken a firm foothold as the marine fuel of the future, a fact that is clear to many stakeholders in the shipping industry. Despite this positive sentiment, the high investment cost for LNG storage systems is commonly cited as one of the major challenges in switching to gas. Wärtsilä continues to develop ways to combine technologies to create cost-efficient storage systems for gas-fuelled vessels of any size and installed volume of LNG.

Wärtsilä Corporation

By Sören Karlsson, Business Development Manager, Wärtsilä Marine Solutions

Shipping is a truly global market, where competition is continuously increasing. The pressure from customers to reduce costs is further amplified by public demand to reduce the sector's environmental footprint. Implementing innovative new solutions or adopting already existing technologies from other areas can be used as means to reduce costs and stay ahead of the competition.

The latter option is typically more straightforward, with lower risks and a shorter time to market. Therefore, comparing the available technologies and their cost drivers can aid in devising

methods to overcome implementation barriers. As a matter of course, every Wärtsilä solution takes into account each customer's unique needs, but this review showcases a few of the ways that Wärtsila can help more customers take advantage of LNG's environmentally and economically sustainable benefits.

Established LNG storage systems

Large LNG carriers have been designed with prismatic membrane tanks for several decades. Today, this design is the most popular LNG containment system for volumes over 100,000 m^3. However, the high degree of sophistication required during onsite manufacturing, combined with the complex cargo handling system, has limited the success of the design as an LNG fuel tank.

At the other end of the scale, the most successful concept for gas-fuelled vessels has been vacuum insulated tanks. Vacuum insulation is the best insulation technology available, and is likely to remain so. A vacuum is maintained in the annular space between the two inner and outer tanks in order to reduce the convective heat transfer.

In addition, the annular space is filled with an absorptive material to reduce the heat transfer due to radiation. With very low boil-off rates, the tank pressure can be easily maintained below the opening pressure of the safety valves for very small storage volumes. Therefore, vacuum insulated tanks will continue to be the preferred alternative for small LNG storage tanks below 240 m^3.

The standard storage system for transporting various liquid hydrocarbons at low temperatures for several decades has been the IGC Code Type-C austenitic steel pressure vessels. The insulation was initially applied using polystyrene panels glued to the outer surface of the pressure vessel. Today, polyurethane foam (PUR) sprayed directly on the surface is the leading insulation method, as it reduces the labour cost during the assembly of the panels on the outer surface. Foam spraying creates a homogenous surface without boundary layers or sources for subsurface crack initiation and propagation mechanisms.

Additionally, the lower heat conductivity of the PUR insulation allows a slightly better holding time with the same insulation thickness. A common misconception is that insulation is fragile and sensitive and cannot be used without a steel canopy for weather protection. In reality, the insulation is covered by an outer fire resistant cladding, which creates a hard outer surface.

New developments in LNG tank insulation

Many believe that PUR insulated tanks require large additional installation space. However, an insulation thickness of 300–350 mm is normally sufficient. Vacuum insulated LNG storage tanks are normally fitted with 250–300 mm annular

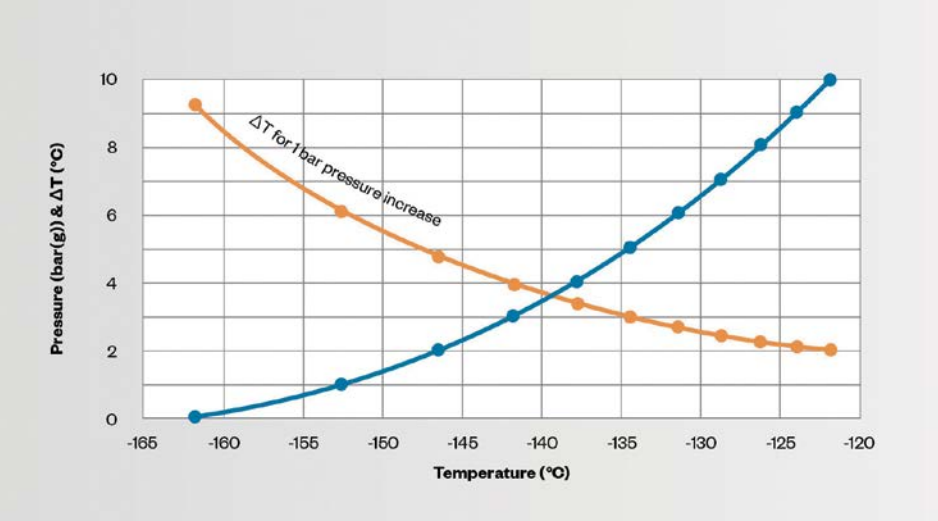


Figure 1. Tank pressure as a function of LNG (Methane) temperature. At atmospheric pressure, an increase of temperature with 9°C raises tank pressure with only 1bar, but at the end 2°C increase has the same affect.

space, despite the lower thermal conductivity. The actual constraint comes from the need to install the interconnecting pipes in the annular space, rather than from insulation requirements. In installations where fast LNG bunkering time is a necessity, the large bunkering pipes may result in an even bigger annular space.

Since the pipes laid in the annular space are almost impossible to inspect and can only be repaired by cutting through the outer tank, the pipe design undergoes vigorous engineering activity, including pipe stress and fatigue analysis, using finite element modelling (FEM). Since the inner tank is suspended in the outer tank, the movement and interaction of the inner tank with the outer tank is taken as boundary conditions for FEM calculations. In a similar way, the local stresses are analysed for both the inner and outer tank, where the forces from the piping impact the tank design.

Hence, a high degree of competence is required in each discipline, with numerous engineering hours before the design is completed. The design is then submitted to the nominated classification society for approval. Once the approval has been received, the long lead items, such as steel plates and castings, can be ordered. The high degree of technical sophistication inevitably increases the amount of engineering hours and, consequently, costs.

A vacuum insulated tank is, in principle, two pressure vessels, where one pressure vessel is installed inside the other, and a vacuum is applied in the annular space. The inner tank is designed to withstand the internal pressure plus an additional 1 bar of pressure for the vacuum in the annular space. The outer tank only needs to withstand the suction force from the vacuum, or the buckling force. For a cylinder, internal vacuum is more challenging to withstand than internal pressure.

Therefore, the outer tank plate thickness is similar to the inner tank plate thickness. Eliminating the outer tank and applying PUR insulation can reduce the LNG storage system weight by approximately 40%, compared to a vacuum insulated tank design.

Similarly, the saddles for a single shell tank are simpler in design and can even be incorporated in the ship's hull. It is possible because the saddles cannot come into contact with cryogenic LNG in any damage scenario, thus avoiding becoming brittle. Consequently, the saddles can be made of carbon steel instead of stainless steel. This straightforward single shell mechanical construction reduces the engineering effort, saving large amounts of material. These cost savings can be directly transferred to the end user, reducing the overall cost of the LNG storage system.

Lower LNG tank pressure, longer holding time

As heat leaks into the tank, LNG evaporates and slowly increases the tank pressure. The classification society requirement for a minimum holding time of 15 days regulates the minimum insulation requirements for an LNG storage tank. Figure 1 shows the equilibrium curve between vapour and liquid phase of methane from atmospheric pressure up to 10 bar(g). For single shell tanks, gas feed pressure to the consumers can be achieved with deep well pumps,

described later in this article. The pressure and temperature in the tank can, therefore, be kept at the original LNG bunkering temperature. A pressure increase from atmospheric pressure to five bar would require an LNG temperature rise of 27°C.

However, for medium-speed engines, sufficient engine feed gas pressure is typically achieved by pressurising the LNG tank to the engine operating pressure of approximately 5 bar(g), by means of evaporating a small quantity of LNG and feeding the gas back to the tank. The starting point for the pressure increase is thus the operating pressure of 5 bar(g). Due to the exponential nature of the equilibrium curve, the liquid at higher pressures absorbs much less heat. A pressure increase from 5 bar(g) to the maximum allowed pressure (10 bar(g)) results only in a net temperature increase of 12,5°C, in other words, approximately only half the amount of energy that can be absorbed in the upper pressure range. Thus, the lower pressure range is the most critical and partly compensates for the lower insulation properties of PUR insulated tanks.

The regulations for gas-fuelled vessels also allow gas consumption by engines and boilers, as a means to handle the boil-off gas (BOG) generated. The consumers of the BOG have to be available at all times; thus, power for the propulsion system cannot be considered as a gas consumer. However, electricity for the hotel load, generated by dual-fuel auxiliary engines or a generator connected to a main engine power take-off (PTO), may be added, provided that gas can be extracted directly from the LNG tank's gas phase. Extracting the BOG from the gas phase will reduce tank pressure and consequently increase the holding time.

The various systems are fully integrated to achieve maximum efficiencies. Complete propulsion plant delivered by Wärtsilä including CPP, 2 x 6L50DF, twin-in single out gearbox, 2 x 6L20DF auxiliary gensets.

By engineering and supplying the complete cargo plant, the gas fuel supply system and the propulsion plant enables Wärtsilä to achieve optimal energy consumption efficiency for the entire vessel.

Here, the advantages of using Type-C tanks are evident. As the tanks are designed as pressure vessels, the BOG, therefore, can be easily fed directly to the auxiliary engines without the need for compressors.

A rectangular or prismatic tank is optimal with respect to space utilisation, but it cannot easily withstand internal pressure without adding stiffeners, etc., which add considerable weight and manufacturing effort. Therefore, a BOG re-liquefaction system has to be installed in order to control the tank pressure. The re-liquefaction system substantially increases the investment costs and reduces the system's feasibility as a storage system for gas-fuelled vessels. However, for LNG carriers, the economy of scale reduces the auxiliary system cost per cubic metre stored, making prismatic tanks competitive above 10,000 m^3. Several new designs and concepts are on the drawing board, and the first contracts have been awarded for smallscale LNG carriers.

A safer, more reliable LNG pump

Medium-speed, gas-burning engines have been the favoured option for gas-fuelled vessels for almost two decades. Today, as the concept of operating on natural gas has matured, large 2-stroke engines are available on the market. Both the sizes of the vessels and of the prime movers, as well as the LNG storage volumes, are increasing.

The 2-stroke engine's feed gas pressure requirements exceed the technical and economic feasibilities of simply pressurizing the tank. The feed gas pressure is, therefore, preferably achieved by means of centrifugal pumps, which are reliable and do not require frequent overhauls. However, since liquefied gases are stored close to or at boiling point, maintaining a positive pressure on the suction side of the pump is crucial in order to avoid cavitation of the pump. If the pump is installed outside the tank, the sensitive, bottom-tank penetration needs to be protected, and the number of pipe bends before the actual pump has to be minimised.

Alternatively, installing the pump inside the tank creates an inherently safe design and eliminates a pressure drop in the suction line. However, maintenance of the submerged pump can only be done during a scheduled overhaul. Therefore, extra pumps are installed in order to achieve sufficient redundancy.

The Wärtsilä Svanehøj ECA Fuel Pump offers a number of new possibilities, including having no tank connections below liquid level, no electrical components inside the tank, and minimal contribution to the generation of BOG, since the electrical motor is installed outside the tank. Having less heat and pressure build-up in the fuel tank makes the new pump very safe. In harsher operating conditions, this system also maintains the pressure, thereby ensuring a continuous flow of gas to the LNG-fuelled engine. Furthermore, compared to conventional pumps with the motor installed inside the fuel tank, having the motor on the outside of the tank eliminates the transfer of as much as 70% of the electrical energy as heat to the LNG.

The design is based on more than 5,000 deep well gas pumps in operation around the globe and will ensure a steady, safe, and reliable supply of gas to the engine, regardless of weather or thermal conditions. This pump is designed for a service life of at least 25,000 operating hours or five-year service intervals. Should something unexpected happen, it also has a contingency in place, whereby the pump can be serviced under a 'three service area concept,' which enables access to the motor, bearing and pump, even with gas pressure in the tank.

Wärtsilä Svanehøj ECA Fuel Pump with five years or 25,000 hours service interval. Pump can be retracted even with gas in the tank.

Conclusion

Today Wärtsilä is recognized as a leader in propulsion solutions for gas-fuelled vessels. The company's strong and early commitment to this goal has created in-depth knowledge of the use of natural gas and LNG. There are several alternative LNG storage systems available, which have already earned their place in the LNG distribution chain. Due to the better insulation properties, for volumes below 250 m^3 the vacuum insulated tank will be the preferred choice in order to meet a holding time above 15 days.

However, the robustness and simplicity of the single shell design reduces both engineering and material costs without sacrificing system safety or integrity. It is, therefore, likely that the popularity of this design will increase for gas-fuelled vessels in the 300–5000 m^3 volume range. The business case for gasfuelled vessels continues to become more attractive. Existing and new technologies are being adopted to help drive the total cost of ownership down and make LNG an environmentally and economically sustainable propulsion solution.

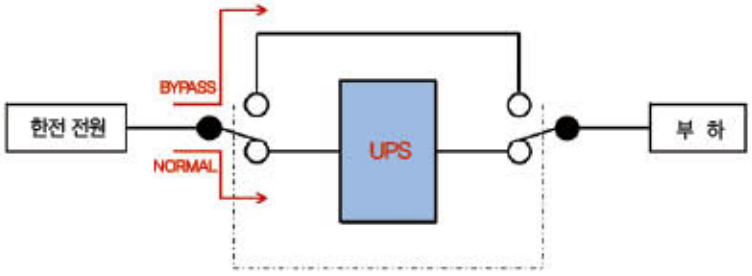
Kraus & Naimer
BLUE LINE switchgear

◈UPS Bypass Swtich의 장점

▶ 최고의 신뢰성
- 완벽한 내구성
- 100여년간 스위치만 만든 Kraus & Naimer
- Kraus & Namier는 세계적 기업으로 전 세계 어디서든 구매 가능

▶ 다양한 확장성
- 10A ~ 2400A 용량
- Normal – Bypass
- Normal–Test–Bypass (UPS Test mode 가능)
- System 구성의 필요에 따라 회로 구성 가능

◈UPS 구성 예시



◈ 안전성

▶ 차단기를 사용할 경우
- 세 개의 차단기를 순서대로 차단/투입시켜야만 하는 불편함
- 오동작 가능성 높음

▶ UPS 스위치를 사용할 경우
- 손쉬운 Normal – Bypass 전환 가능
- 긴급 상황시 비인가자도 전환 가능
- 기계적 인터록 구성으로 오동작 가능성 없음

◈ Application

▶ Repair / Emergency 상황
▶ UPS Replacement

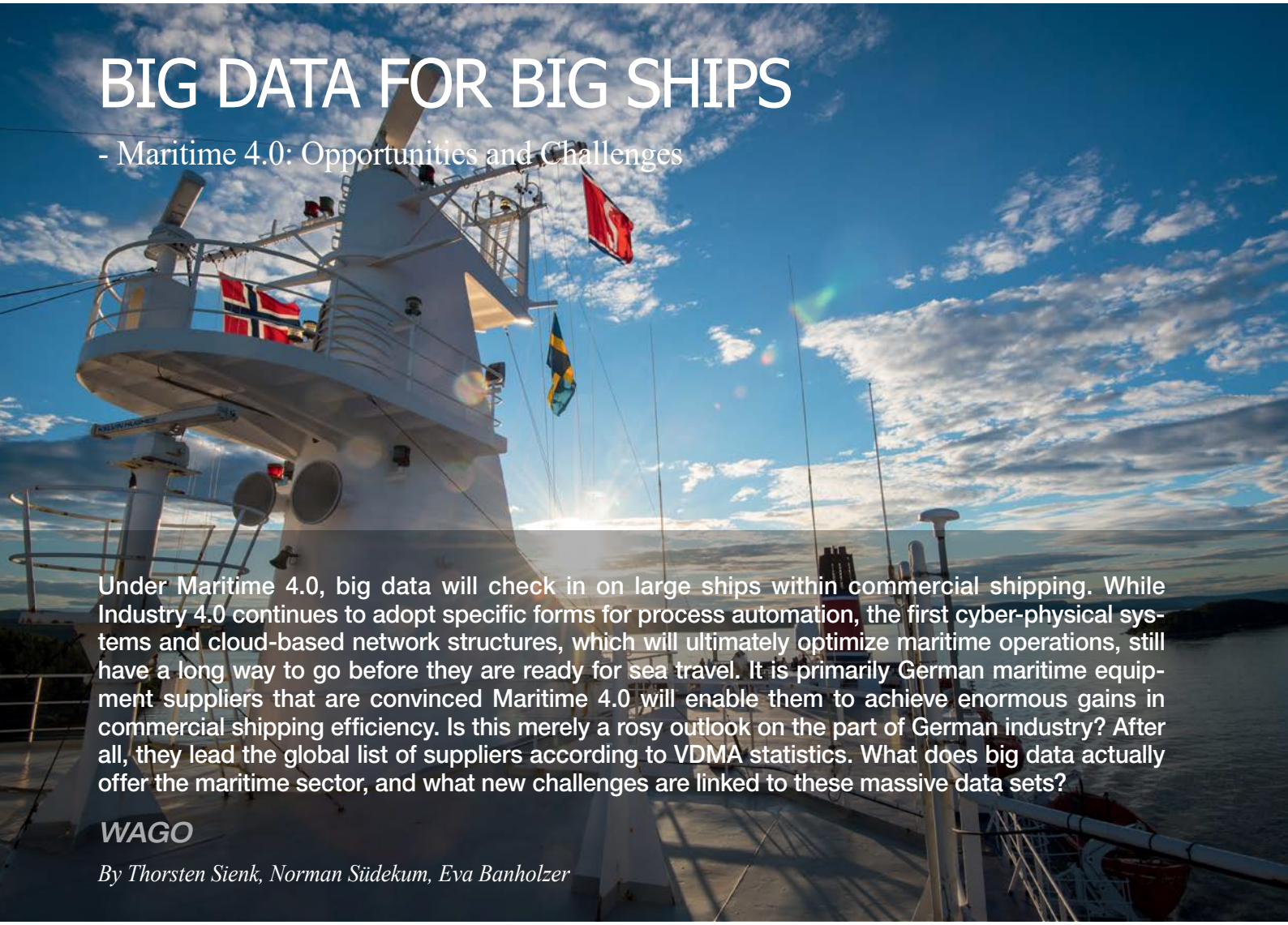
※ 연락 하시면 종합 Catalog을 보내드립니다

KUMSAN
(주)금산엠엔이

서울시 금천구 시흥대로 281(시흥동, 새한벤처월드빌딩 #506)
TEL : 02)804-9666 FAX : 02)804-9664 E-mail : info@kumsanmne.com
www.kumsanmne.com

BIG DATA FOR BIG SHIPS

- Maritime 4.0: Opportunities and Challenges



Under Maritime 4.0, big data will check in on large ships within commercial shipping. While Industry 4.0 continues to adopt specific forms for process automation, the first cyber-physical systems and cloud-based network structures, which will ultimately optimize maritime operations, still have a long way to go before they are ready for sea travel. It is primarily German maritime equipment suppliers that are convinced Maritime 4.0 will enable them to achieve enormous gains in commercial shipping efficiency. Is this merely a rosy outlook on the part of German industry? After all, they lead the global list of suppliers according to VDMA statistics. What does big data actually offer the maritime sector, and what new challenges are linked to these massive data sets?

WAGO

By Thorsten Sienk, Norman Südekum, Eva Banholzer

It is said that you are in God's hands when you are on the high seas and in court. This adage has lost nothing of its significance in the 21st century. There is always an amount of uncertainty in the courtroom as to how the legal situation will be resolved, and similar uncertainties prevail on the high seas. Even when ships are following defined routes, they remain exposed to the forces of nature, the reliability of the technology or even pirates. While some discuss redundancies and reliability, others contemplate autonomous ships that could alleviate the risk of pirates, since pirates are more interested in the ransom they can extort for hostages than they are in the cargo itself. Will driverless transport systems, which are already used for logistics on land, change the image of the global seas?

Sector experts are convinced of the enormous potential of big data

Remote-controlled cargo ships on international waters are currently only dreams; however, they are approaching reality as automation is increasingly incorporated into ship designs and enables that which was inconceivable a few years ago. Examples include the networking of subsystems, which allows the linking of systems for finer tuning and significantly more efficiency; or remote access from land to read ship

data or engage in the ship's operation to control specific functions.

Whether or not people remain on board, sector experts like Hauke Schlegel, director of the VDMA "Marine Equipment and Systems" department, are convinced that, "an unimaginable potential is concealed" in big data. The maritime sector, with the German maritime economy as the leading global supplier, stands to profit from big data – a fact that pleases Schlegel immensely. While it appears that in the foreseeable future China, Japan and Korea will close shipyards due to overcapacity, the German mechanical engineers and system designers are traveling in calmer waters. And while their future may not be rosy, it appears to be stable. And now the digital revolution offers further opportunity? What can ships and shipping actually get from this new technology? Let us examine efficiency, environmental protection and security in the shipping industry more closely.

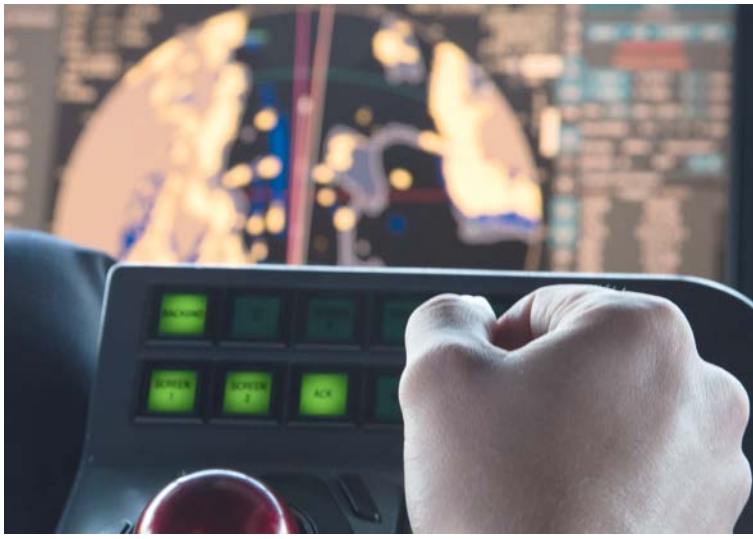


Figure 1. Today, large-format monitors, rather than the view from the bridge, direct commercial and passenger ships.

Cost reductions due to unmanned shipping

In general, cargo services suffer daily from high and ever-increasing cost pressures. The reason for this is simple: there is too much available shipping tonnage underway on the oceans – a result of speculation during the boom years between 2004 and 2009. Overcapacity and ongoing price erosion are the end result. Transport services are therefore attempting to retain their economic viability by reducing costs. And anywhere cost reductions are discussed, labor costs are always under consideration – even for shipping companies. For them, it specifically means a choice between quantity or quality. Companies either reduce the crew numbers on board, or the rely on a crew with lower electro-technical qualifications and correspondingly lower rates of pay. Both scenarios can be realized by implementing automation. Automated systems are capable of taking over many long-term tasks that were previously performed by humans. They also allow for remote functionality, which enables land-based experts to read a ship's data in order to oversee maintenance people at sea.

If the crew numbers on board fell to zero, there would be profitable benefit: small subsystems, such as, wastewater treatment systems, climate control and desalinization plants, would be eliminated if a ship were autonomously guided. Transport services could save approximately 10 % in fuel costs alone if they did not have to offer the amenities required to feed, house and entertain a crew.

Allocating costs according to their sources

With or without a crew: On a ship, there are many applications that could be operated more efficiently, aside from crew amenities. Measuring, evaluating, formulating remedies - Maritime 4.0 holds tremendous promise for these specific areas. Consider building management for a moment: By employing data recording and networking, consumption and costs can be determined and optimized down to the individual room level.

Comparable measurements do not occur on container ships. However, different containers contribute to different levels of transportation costs. This is due to the fact that, despite the standardized dimensions of a container, all cargo is not the same, which is abundantly clear when one considers "reefers." Reefer is the term used for refrigerated containers, which must either be cooled using the ship-side cargo cooling system or have their own cooling systems. These, in turn, draw energy from the onboard network. In both cases, the cooling directly impacts fuel consumption on the ship, because the generators have to provide electrical energy and the main engine consequently demands more output. It is obvious that refrigerated containers are responsible for higher shipping costs compared to other containers.

In daily practice, however, infrastructure costs are uniformly distributed among all containers loaded on a ship. If integrative network technology could determine how high the energy demands of a reefer actually are, then the shipping costs

Figure 2. From Oslo to Frederikshavn: in the narrow fjords of Norway, land-to-ship communication remains simple.

could be allocated according to the source and individually calculated. Different cargo tariffs could be defined for different routes, because travel in the vicinity of the equator requires more electricity for cooling than cooler regions. Technologically, such tasks could be solved without a problem by currently available technology. WAGO's PFC200 Controller offers, for example, storage potential for monitoring data outside of the cloud in parallel to its own processor performance. Also, this monitoring is already required in order to document the uninterrupted cooling chain and thus the operational safety of a reefer.

Route planning instead of full steam across the ocean

Another example of the advantages that result from closer data networking can be measured in fuel consumption. If routes are plotted around low-pressure zones, for example, fuel is saved. Consequently, it is advantageous to evaluate weather data with more than safety in mind. Additional processing of harbor information follows a similar path. Prof. Holger Watter, Dr.-Ing and president of the Technical University of Flensburg, recently enquired, "What is the use of traveling at full speed to a harbor, if I have to wait for a docking position?" When considering fuel consumption, it is substantially more efficient to adjust the traveling speed so that a cargo or container ship arrives punctually in a harbor that is logistically prepared to handle its freight.

Experts have estimated the monetary rewards that could result from optimizing fuel consumption and idle times to be so great that the EU has launched the "Sea Traffic Management" project. This initiative seeks to precisely synchronize shipping operations using communication, networking and big data. The basic premise of the project is that ships' data, which can be coordinated with one another, is

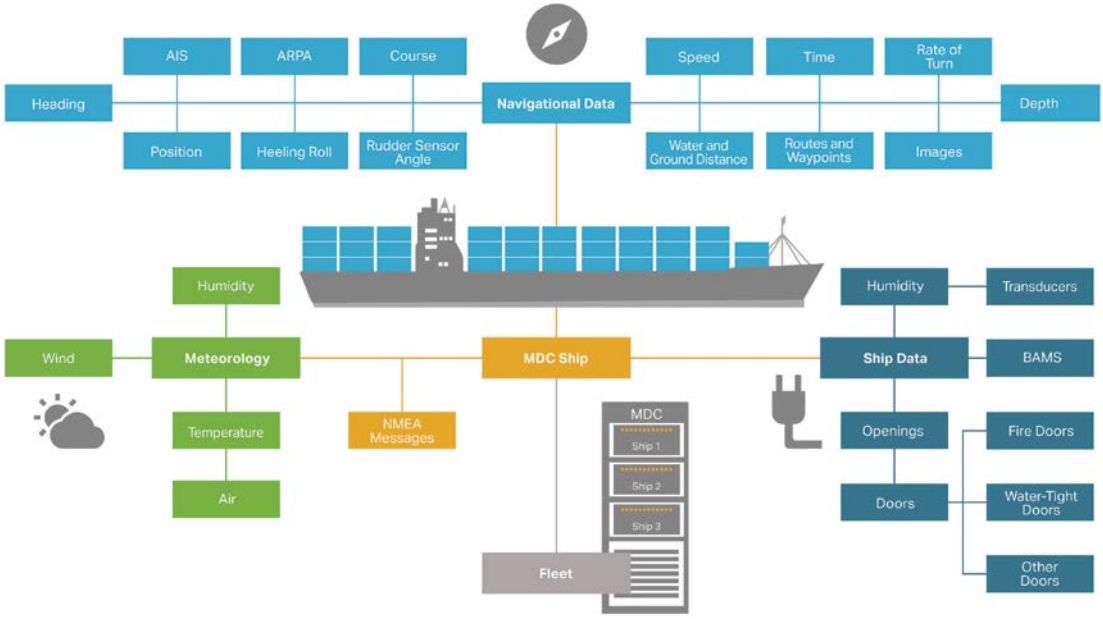


Figure 3. Everything is tightly linked. The chart illustrates how important big data and close-knit networks are for modern shipping operations.

provided in the cloud where other ships can access it. This opens the path for safely passing one another along shipping routes, and arriving punctually in harbors in a sequence. The harbor operators would also profit from synchronized shipping.

They could better prepare for the arrival of ships, which would thus lead to significantly less logistics space for intermediate storage and less capacity for transporting goods. Semis and trains wouldn't have to remain in long queues waiting for specific ships. Agreements of this type would pay off financially and environmentally. "In spite of this, it is not yet common in shipping," opines Proffessor Watter, who clarifies that in this context, it is still more important for ship operators to correctly interpret various scenarios. Watter wants ships' crews, "to be able to correctly read data and determine the correct measures," by which he means that automation systems need good human-machine interfaces.

Maritime 4.0 requires greater IT security

In this context, ships' bridges have long served as automation control centers where information flows together. This includes navigation, communication and cargo information, as well as administrative data, like registration documents and cargo declarations. With electronic maps and automated identification systems (AIS), it is apparent on the bridge that digitalization is increasing on the high seas. The trend speaks loudly, and the described potentials agree: big data for large ships? It would certainly be worth it!

However, cost reductions, environmental protection and increased efficiency also have their price: significantly increased demands on IT security. The risk of data abuse and cybercrime increases alongside the digitization, networking and increasing land-to-ship communication. Anyone who talks about Maritime 4.0, has to discuss IT security – and this means much more than securing a ship against cyberattack, it also involves operational safety of the very ship. It is imperative, in order to protect ship, crew and the environment with suitable technologies, that data transmitted between land and sea are reliably encrypted. An example: access points and access times are regulated, or controllers are used that include "IT security by design" and can also function as intermediate storage if the connection between land and sea is severed for any reason.

Figure 4. Inconspicuous placement, but a serious outcome: if both buttons are pressed in case of a pirate attack, a comprehensive crisis management program will run in the background.

Figure 5. The AIS provides information about key data from other ships on the route.

IT Security: an ongoing competition

In view of the serious effects caused by maritime accidents, it is surprising in this context that the current version of the IT Security Act does not include shipping operations among its critical infrastructures, which is a stark contrast to energy and water supply on land. Actually, IT security should be considered a "competition," which occurs between producers, hackers and operators. In order to flexibly react to new threats, an open operating system is the first choice because open-source products are not dependent on just one manufacturer. Rather, open systems are simultaneously used by many programmers who recognize security gaps more quickly and collaborate on improvements. Therefore, WAGO's PFC family is based on Linux® with real-time expansion, which provides common functions for IT security as defaults, regardless of manufacturer, and offers future possibilities for expansion.

TIMCA, Spliethoff vessel

For Spliethoff, Alfa Laval PureSOx scrubbers are well integrated into the vessel – and life on board

What impact does a SOx scrubber actually have on a vessel? Dutch ship owner Spliethoff knows very well. Spliethoff, a specialist in dry cargo, was early to choose a scrubber for marine SOx compliance. In 2012, the company retrofitted Alfa Laval PureSOx on the M/S Plyca, setting the record for the largest marine scrubber ever installed. Today Spliethoff has twenty vessels with PureSOx scrubbers, plus considerable insight when it comes to working with them.

Alfa Laval

One of those most familiar with Spliethoff's scrubbers is Technical Support Engineer Roland Hoogeveen, who has been with the company since the year 2000. In 2014, he was asked to oversee the commissioning of PureSOx systems on twelve Spliethoff vessels, after which he has continued to supervise the scrubber installations throughout the Spliethoff fleet.

Hoogeveen is impressed by the scrubbers' design and inte-

gration, but above all by their exhaust gas cleaning results. “The reliability has been very high,” he says of the PureSOx systems, all of which feature U-design scrubbers. “We’ve not had any major compliance issues.”

PureSOx in the Spliethoff fleet

Today Spliethoff has PureSOx systems on two different types of vessels. Six of them, including the M/S Plyca, are ConRo vessels. An additional fourteen are general cargo vessels, referred to by Spliethoff as S-types.

Because the ConRos operate solely in the North and Baltic Seas, they never leave the North Europe SOx Emission Control Area (ECA). Moreover, they frequent ports in Belgium and Germany, as well as the Kiel Canal, where no water discharge is allowed. For this reason, the ConRos are equipped with hybrid scrubber installations, which can operate either in open-loop mode with seawater or in closed-loop mode with circulation water and an alkaline additive.

The S-types, by contrast, operate worldwide and spend considerable amounts of time on the open sea. Their scrubbers are open-loop systems, though at Spliethoff’s request they were installed “hybrid-ready”. This means that space and blind flanges were incorporated to allow later installation of a water cleaning unit, a circulation tank and the pumps needed for closed-loop operation.

The scrubbers are major installations whose physical impact on the vessels is noticeable. As Hoogeveen points out, however, both Alfa Laval and Spliethoff learned from the M/S Plyca in ways that have benefitted subsequent installations. “Naturally, the scrubber makes the funnel much larger,” he says. “But now the circulation pumps are more or less integrated into the new funnel.”

Working with the scrubber on board

And how do the vessel crews react to PureSOx? According to Hoogeveen, their response to having a scrubber on board depends greatly on attitude. “Shipping is very conservative and new equipment is only added because of new rules,” he explains. “So some chiefs and engineers are less keen and slower to learn. But others learn very quickly and are happy to get their hands on something new.”

In some ways, Hoogeveen points out, the scrubbers have made ECA operation simpler. “SOx ECAs are not new, it’s just that the limits have been reduced a lot,” he says. “Before, there was always fuss with the fuel, where you had to open

Roland Hoogeveen. Technical Support Engineer at Spliethoff controls the Alfa Laval PureSOx.

or close valves and then wait a few hours until the system was flushed for the new fuel type. With a scrubber you just push a button, so in a way the operations actually require less work.”

Even when it comes to troubleshooting, Hoogeveen says, the PureSOx systems are very logical. However, he notes a difference between the open-loop and hybrid systems in this regard. “The open-loop systems are familiar equipment arranged for a different function, so if you have a little understanding of what’s happening in the scrubber, you know enough,” he says. “Closed-loop mode has a lot of added value from Alfa Laval in the way the components are combined, which makes a difference for troubleshooting the hybrids. But the basic operations are quite simple. Changing from open-loop to closed-loop mode is done via the touchscreen and takes 10-20 seconds.”

Scrubber maintenance and logistics

According to Hoogeveen, having PureSOx on board affects only a few Spliethoff crew members to a greater degree. A handful of people – from the chief engineer to the third engineer – handle all of the active work with the system. This includes daily checking of the pipes and visual inspections of the scrubber itself every six months, as well as regular filter cleaning, sensor calibration and other small tasks.

Hoogeveen describes the routine maintenance as negligible and easy to plan, although troubleshooting can take time when the engineers are less familiar with the system. At the

Alfa Laval PureSOx

same time, he says, unplanned maintenance occurs even without a scrubber on board. "Always changing over between HFO and diesel oil means much higher wear on the fuel system, and MGO is more abrasive to the pumps and injectors," he explains. "So there's extra maintenance there that can come unexpectedly. Maybe you've just changed over and you're heading into port, which is not the place you want to have problems."

In terms of consumables and waste, Hoogeveen says dealing with these is simple. Caustic soda for closed-loop operation is sourced where the vessels anchor in Finland, while the sludge from the water cleaning unit is deposited in St. Petersburg, where the vessels bunker fuel. "At first there was a little fuss about how to record the sludge, because it's not oily waste," Hoogeveen says. "But now they have separate columns for separator sludge and scrubber sludge. We dispose of 4-5 cubic metres every three weeks, which has become very routine."

Demonstrating compliance to Port State Control

In fact, most aspects of working with scrubbers are now routine for Spliethoff, including the interaction with Port State Control (PSC). Hoogeveen says that PSC authorities, who are responsible for verifying compliance with legislation, tend to ask straightforward questions and are satisfied with the answers they receive.

When PSC officials come aboard, the procedure is generally relaxed. "You give them the Exhaust Gas Cleaning Record Book if they want to check it, and a colour-coded printout of the important log values," Hoogeveen says. "It's easy to scroll through and see if anything is out of compliance, and then to discuss the reasons."

Hoogeveen adds that some authorities, such as the U.S. Coast Guard, may also look into the Onboard Monitoring Manual (OMM), which shows which sensors are fitted and keeps a record of pH values. "If there is an issue with the gas analyser that measures SO_2 and CO_2, the OMM explains how to interpret the pH values and make sure you're still in compliance," he says. "We've had to do that on a few occasions across our fleet."

Overall, Hoogeveen describes the PSC attitude as friendly and curious. "They have a learning curve too, and right now there aren't too many scrubbers sailing around," he says. "But as their knowledge becomes deeper, they will know more about what to check and look for."

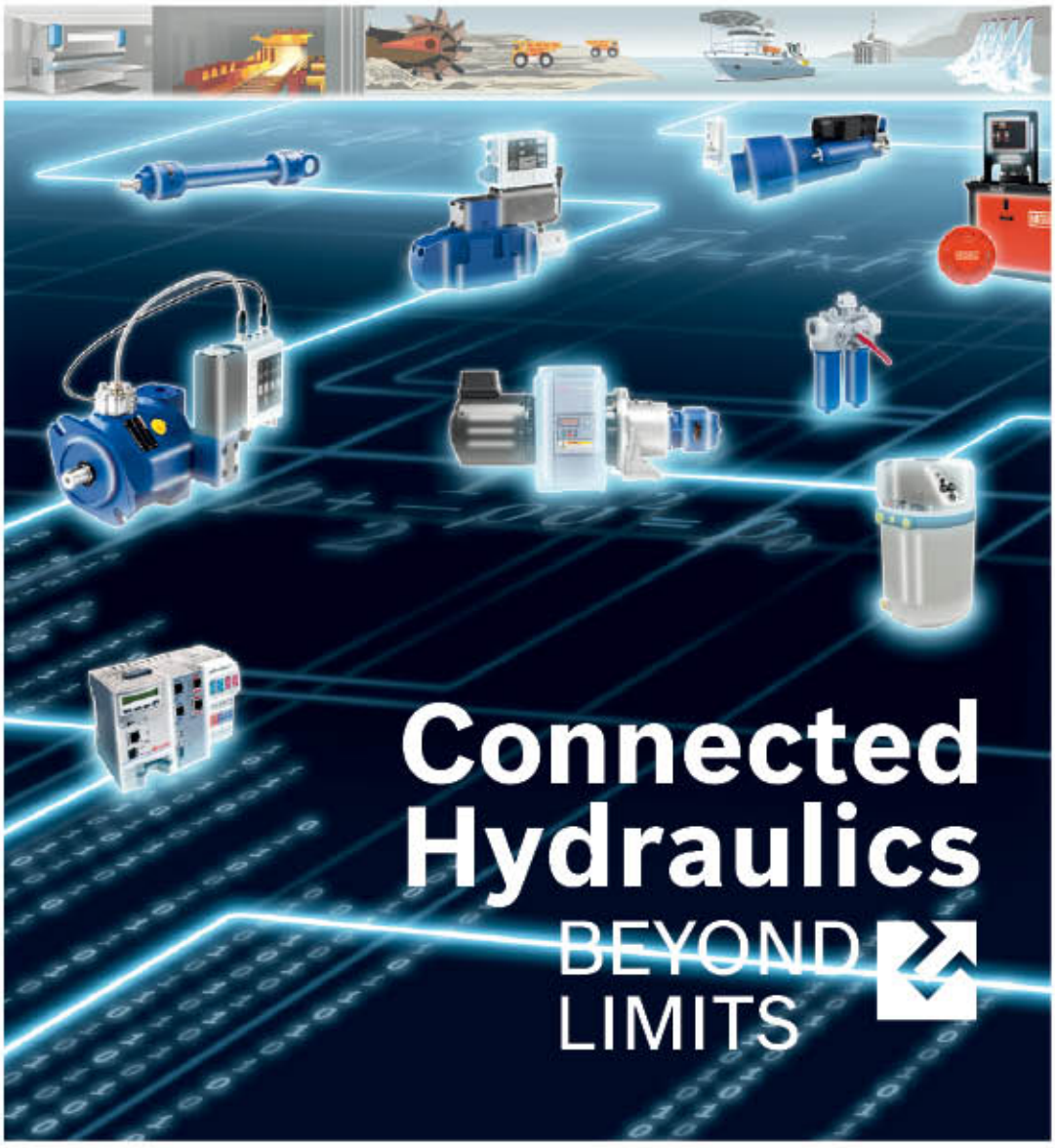
A safe investment with real cost savings

Given the relative ease of demonstrating compliance, but above all the rapid payback through fuel cost savings, Hoogeveen is convinced that scrubbers are right choice – even if they feel unfamiliar at first. "For me it was a bit of a surprise that they would even install scrubbers on all these ships, since some were almost fifteen years old," he says. "But if you can earn back the scrubber within two years, it's worth it. If you can use it for three, you've already made a profit."

In fact, Hoogeveen downplays the newness of scrubbers, suggesting that ship owners should view things in another light. While marine scrubbers are still relatively uncommon, the compliance alternative is an even bigger unknown.

"Nobody really knows the new low-sulphur fuel blends, and their quality is very unpredictable," says Hoogeveen. "If you encounter bad quality, you can have problems with pumps, injectors and filters in the fuel system. Maybe you experience a blackout, where the whole system goes down. And that can go really fast."

"With a scrubber, you don't have to change fuels," Hoogeveen concludes. "So in that way, the scrubber is actually the safe solution."




모니터링 센서부착 액시얼 피스톤펌프 (Industry 4.0)


연속 젝킹 시스템


유압 밸브류


조선/ 해양 전용 전기 드라이브 시스템

Rexroth – Your Partner for Smart Solution in Marine applications!

세계적인 구동/제어 시스템 솔루션 공급사인 보쉬렉스로스는 조선해양산업 분야에서 "REMAN (Remanufacturing) 서비스" 및 "스마트 솔루션"을 제공해 드립니다. 기존의 낡은 장비를 새것 처럼 다시 제조해 드리는 서비스를 제공함으로써 고객의 비용절감과 만족도를 높여 드립니다. 또한, 4차 산업의 선도 주자로서 보쉬렉스로스는 예방정비가 가능하도록 상태 모니터링 센서가 부착된 펌프(A4VSO + Sensor)를 개발 공급하고 있습니다.

보쉬렉스로스가 제공하는 조선/ 해양 전용 전기 드라이브 및 제어 시스템과 다양한 해양시스템 솔루션 (연속 젝킹 시스템, Heave Compensation 시스템, 심해용 유압기술 등)은 스마트한 에너지 효율 및 고객 여러분의 전체 비용절감을 보장해 드립니다.

Now, Time to Update! Next, Connected Hydraulics!

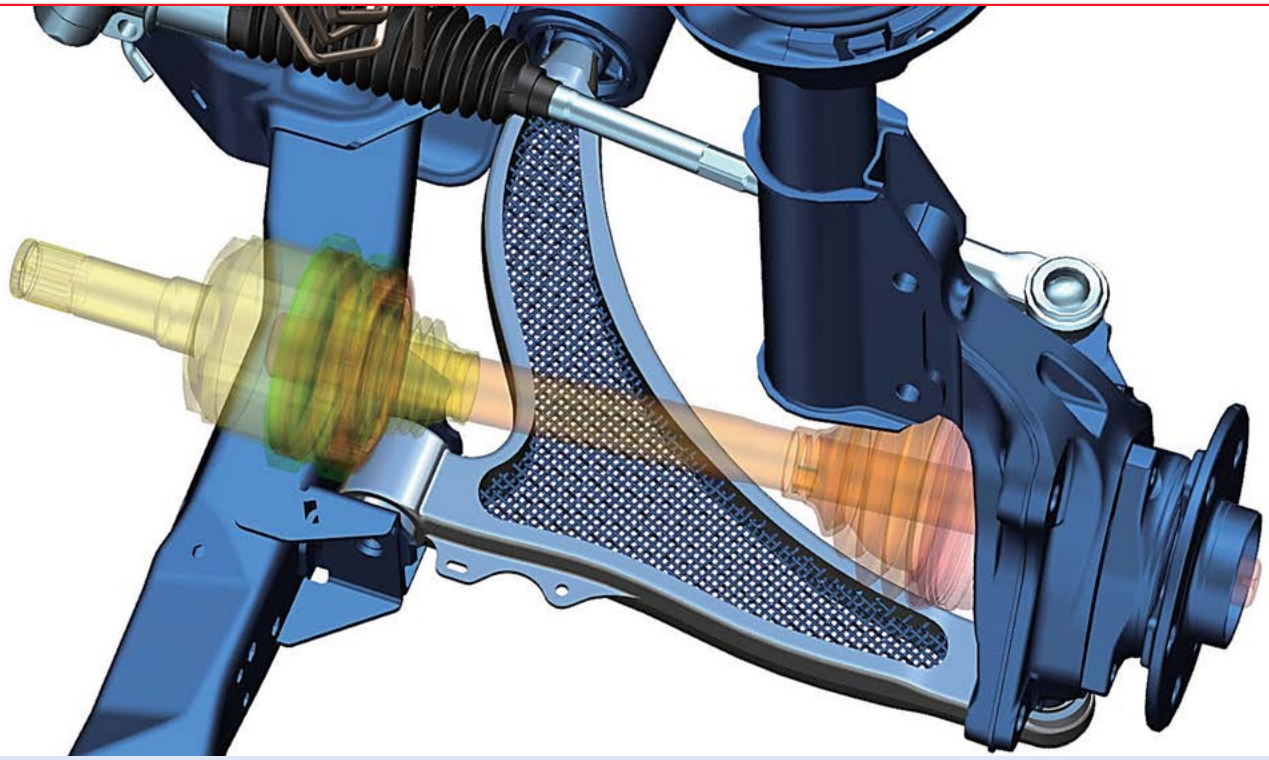
(주)보쉬렉스로스코리아
Bosch Rexroth Korea Ltd.
www.boschrexroth.co.kr
info@boschrexroth.co.kr

부산 본사
부산광역시 강서구 미음산단 1로 29
TEL : (051) 260-0700
FAX : (051) 260-0709

용인 사무소
경기도 용인시 기흥구 영덕동 흥덕 1로 13
흥덕 IT밸리 23층 2308호
TEL : (031) 270-4200
FAX : (031) 270-4298

The Drive & Control Company

Rexroth
Bosch Group



The Next Generation Design Platform 'NX 12'

Siemens' NX provides multidisciplinary tools for product development in a unified platform.

Siemens PLM software

Siemens announced the latest version of the company's NX™ software. Building on its legacy of best-in-class customer deployment readiness and data preservation, the latest version delivers the next generation of design, simulation and manufacturing solutions that enable companies to realize the value of the digital twin in the end-to-end process. This latest release unites electrical, mechanical and control systems through close integration with Mentor Graphics Capital and Xpedition portfolios for electrical systems, harness and PCB design. Combined they provide the only true multidisciplinary platform available in the market today.

At the highest level, NX underpins tools used for systems driven product development based on the RFLP (Requirements, Functional, Logical and Physical) methodology, which now provides a significant connection between the logical and physical abstractions in both electrical and mechanical domains. Building on Convergent Modeling™ technology that allows designers to seamlessly work and model with mesh geometry in combination with precise geometry, the new version combines tools for design optimization, advanced geometry creation, freeform shapes and parametric design to make generative design a reality.

"This latest version of NX is clearly a major milestone for Siemens and their customers," said Allan Behrens of Taxal. "Moving beyond previous convergent technology to encompass significant developments in areas of generative, additive and multidisciplinary design is impressive. With such significant additions, I'd suggest that clients will be delighted to see past and future investments evolve to deliver leading-edge capabilities for tomorrow's more demanding, often complex

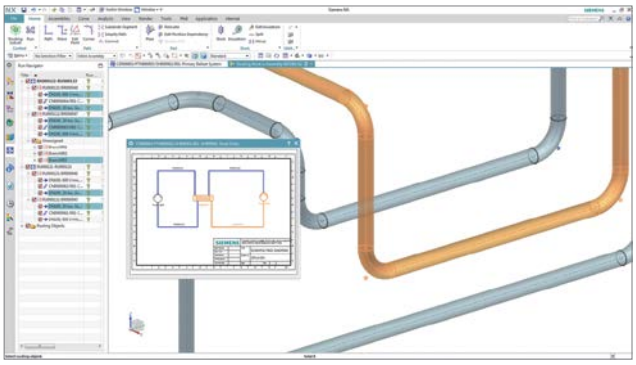
product design and manufacturing ecosystems. These developments are part of a larger roll-out that also touches on areas including large assembly performance and model based engineering. The recent addition of Mentor's EDA, electrical and embedded technologies, and the remarkably rapid integration of the electrical systems, harness and PCB elements with the NX ecosystem provides Siemens with unique solution coverage capabilities that go well beyond their competitors and are highly valuable for many, not least those in the automotive and aerospace industries."

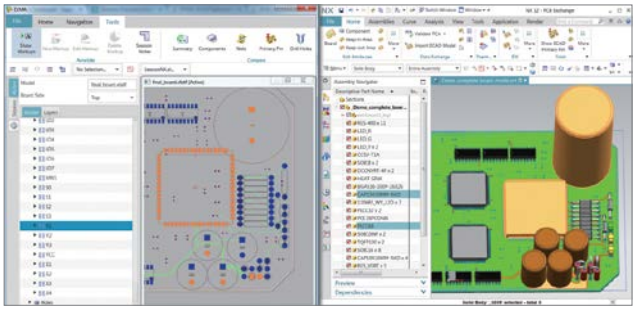
Electronics are fast becoming essential to all products, regardless of industry, making it more important than ever that electrical and mechanical designers collaborate throughout the product development process. Employing technology from recently acquired Mentor Graphics, the latest version of NX provides a direct connection between the design of electrical and mechanical systems. Linking the electrical tools and the 3D model, enables co-design including cross-probing, allowing designers of wiring diagrams and harnesses to work much more closely together, preventing costly and time-consuming rework due to electromechanical issues.

Multidisciplinary work is not limited to electrical design. Industries involving large amounts of piping, such as ship building, will benefit from close integration between instrumentation diagrams and 2D schematic layouts. New tools in NX allow engineers to lay out piping and instrumentation diagrams in two dimensions, while maintaining the design tied to the 3D space model. This synchronization can help eliminate errors and save time as teams work more closely than ever before.

"As embedded technology continues to increase in complexity, it is critical for product design tools to stay ahead of the multidisciplinary technology needed to effectively create and innovate these advanced products," said Bob Haubrock, senior vice president of Product Engineering Software, Siemens PLM Software. "With the latest version of NX, Siemens is providing a true multi-disciplinary platform, combining mechanical, electrical and control systems. Close collaboration between each of these design facets will eliminate errors, provide savings in time and cost, and ultimately enable our customers to drive more innovative designs."

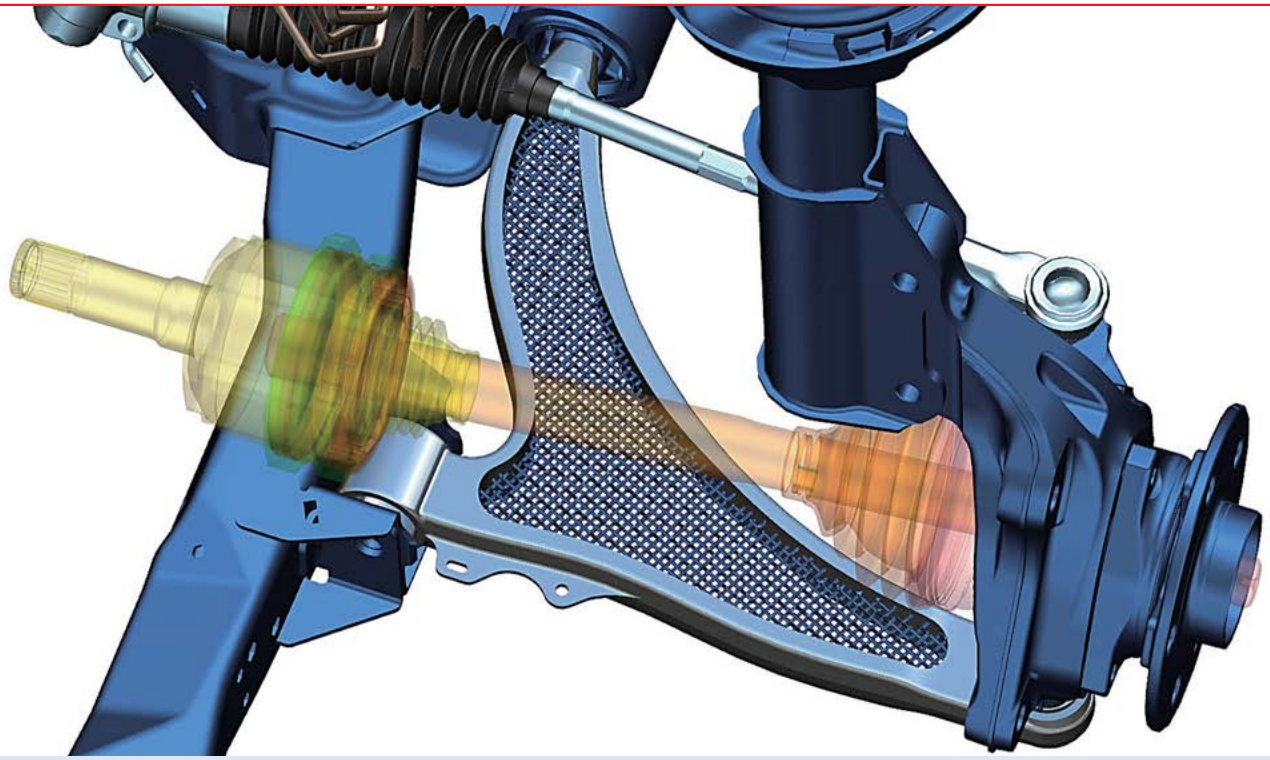
With increasing pressure to deliver products to market more quickly, generative design is now a necessity in product development. Integrating a wide variety of tools gives designers more flexibility and choice when dealing with complex geometries. Using these technologies in combination also allows companies to go beyond traditional solutions that focus solely on optimizing shape in order to achieve truly multidisciplinary design.





In the constant drive to reduce component weight and improve resource usage, companies are looking to incorporate lattice structures into design in order to meet these goals without compromising on strength and structural integrity. The latest version of NX delivers new approaches to design for additive manufacturing, including the ability to add lattice. Convergent Modeling makes it possible to work directly with faceted geometry such as these lattice structures, saving companies from the lengthy data conversion process normally required. This enables companies to deliver lighter, stronger products to market in much less time.

"The fact that the faceted geometry now comes in as a convergent body and behaves pretty much as a sheet or solid body is very beneficial. It will make our workflow much more efficient and save time that we can spend on other things, such as more projects," added Jonas Brochman, engineering method specialist of Manufacturing Engineering, GKN Aerospace Engine Systems, Sweden. "The ability to associatively compensate and reposition the faceted scan data of hardware in an associative and controlled way will greatly help us to increase efficiency and resulting quality."



차세대 디자인 플랫폼 'NX 12'

NX 12는 통합된 플랫폼 내에서 제품 개발 위한 다양한 분야의 기능을 제공한다.

지멘스 PLM 소프트웨어

지멘스 PLM 소프트웨어는 CAD/CAM/CAE 통합 솔루션의 최신 버전인 NX 12 소프트웨어를 출시한다. 기존 버전이 가진 동급 최강의 사용자 인스톨 환경 및 데이터 관리 역량에 기반한 최신 버전은 차세대 설계, 시뮬레이션 및 제조 솔루션으로, 고객이 기획단계에서 제조까지 아우르는 엔드-투-엔드 프로세스 내에서 디지털 트윈(Digital Twin)의 가치를 실현할 수 있는 역량을 제공한다. NX 12는 전장 시스템과 하네스 및 PCB 설계용 멘토 그래픽스 캐피털(Mentor Graphics Capital)과 엑스페디션(Xpedition) 포트폴리오를 통해 전기, 기계 및 제어 시스템을 하나로 통합해 진정한 의미의 다분야 설계 플랫폼을 시장 최초로 선보였다.

NX는 기구와 전장 설계의 두 영역 내에서 논리적, 물리적 개체 간의 중요한 연결을 제공하는 RFLP(Requirements, Functional, Logical and Physical) 방법을 기반으로 제품 개발을 주도하는 시스템 기반의 제품 설계(System Driven Product Development)를 위한 툴을 지원한다. 또한 정밀한 지오메트리와 메쉬 기반의 지오메트리를 원활히 사용하고 모델링하도록 지원하는 컨버전트 모델링(Convergent Modeling™) 기술에 기반한 최신 버전은 사용자들이 설계 최적화, 고급 지오메트리 생성, 자유곡면(Free-from) 생성 및 변수(Parametric) 설계용 툴을 결합해 제너러티브(Generative) 설계를 구현 할 수 있다.

택설(Taxal)의 앨런 베런스(Allan Behrens)는 "NX 최신 버전은 지멘스와 지멘스 고객들에 중요한 이정표와 같다. 기존의 컨버전트 기술을 뛰어넘는 제너러티브(generative), 적층(Additive) 및 다분야 통합 설계 분야에서 이뤄진 괄목할 만한 개발 사항을 한데 모은 점은 매우 인상 깊다. 신제품을 통해 선보이는 대대적인 개선을 통해 고객들에 과거와 미래의 투자가 진화해 더욱 까다롭고 복잡한 생산 설계 및 제조 생태계에 부합할 수 있는 최첨단 기능을 제공하게 된 점을 고객들은 매우 기쁘게 생각할 것이라 본다. 이와 같은 개발은 대

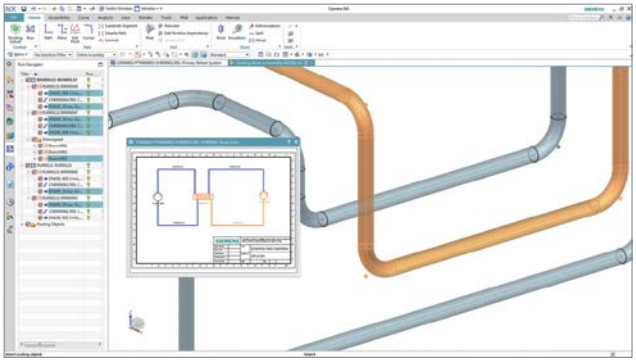
용량 어셈블리 성능 및 모델 기반 엔지니어링을 포함한 여러 영역에 적용되는 대규모 기능 개선도 또한 포함하고 있다. 최근 멘토의 EDA(회로설계부문)과 전장 시스템 및 임베디드 기술을 확보한데다, 이러한 전장 시스템과 하네스, PCB 요소를 NX 플랫폼과 통합시킨 지멘스는 경쟁사를 능가할 수 있는 특별한 솔루션 커버리지 능력을 갖추게 되었다. 이러한 노력은 자동차 및 항공 산업에 국한되지 않는, 여러 산업에 걸쳐 높은 가치를 제공할 수 있는 기업으로 자리매김 하게 되었다"고 말했다.

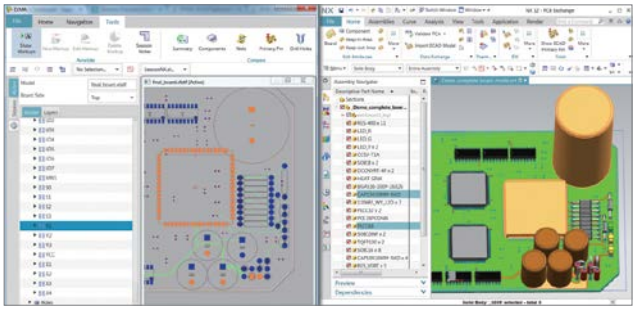
전자제품은 산업에 관계없이 모든 제품에 필수 요소로 빠르게 자리잡고 있어 제품 개발 프로세스 전반에 걸친 전장 및 기구 설계자 간 협업이 그 어느 때 보다 중요해졌다. NX 최신 버전은 최근 인수한 멘토 그래픽스의 기술을 채택해 전장 설계와 기구 설계를 직접 연결한다. 전기적 툴과 3D 모델을 연결하면 교차 탐색을 포함한 공동 설계가 가능해 배선이나 하네스 설계자들이 더욱 긴밀히 협업할 수 있어, 전자기계적 문제로 인한 재작업에 드는 시간 및 비용 소모를 방지할 수 있다.

다분야 작업은 전장 설계에만 국한되지 않는다. 선박 건조 등 대규모 배관을 사용하는 업계들도 배관도(PID)와 2D 기반의 레이아웃을 긴밀히 통합하는 데서 오는 장점을 누릴 수 있다. 엔지니어들은 NX의 새로운 툴을 활용해 배관도 및 레이아웃 도면을 2D 기반으로 레이아웃 할 수 있으며 이를 3D 공간에 연결해 사용할 수 있다. 이러한 동기화로 작업 시 오류가 제거되고 협업 효과를 높여 작업 시간 절약이 가능하다.

밥 호브록(Bob Haubrock) 지멘스 PLM 소프트웨어 제품 엔지니어링 소프트웨어 수석부사장은 "임베디드 기술의 복잡성이 계속 증가함에 따라 제품 설계 툴은 고급 제품을 효과적으로 만들고 혁신하기 위해 필요한 다분야 기술보다 한발 앞선 능력을 갖춰야 한다. 지멘스는 NX 최신 버전을 통해 기계, 전기 및 제어 시스템을 결합하는 진정한 의미의 다분야 플랫폼을 제공한다. 각 설계 부문들 간 긴밀한 협업이 이뤄져 오류가 제거되어 작업 시간 및 비용이 절감되며, 궁극적으로 소비자들이 혁신적인 설계를 구현할 수 있도록 지원한다"고 말했다.

제품을 시장에 더 빨리 선보여야 한다는 압박이 커지면서 제너러티브 설계(generative de-sign)가 제품 개발의 필수로 자리잡고 있다. 여러 다양한 툴의 결합은 복잡한 지오메트리 작업시 설계자들에 한층 높은 유연성과 선택의 여지를 제공한다. 기업은 이들 기술을 결합 사용해 형상 최적화에만 집중했던 기존 솔루션을 너머, 진정한 의미의 다분야 설계를 실현할 수 있다.





부품 무게를 줄이고 자원 사용을 개선하려는 움직임이 계속되는 가운데, 기업은 강도나 구조적 무결성을 손상시키지 않으면서 원하는 개선을 이룰 수 있도록 설계에 격자 구조를 통합시키는 방법을 검토하고 있다. NX 최신 버전은 적층 제조용 설계에 격자 추가를 포함한 여러 새로운 방식을 제공한다. 컨버전트 모델링을 사용하면 앞서 언급한 격자 구조 등 패싯(facet) 지오메트리와 직접 작업이 가능해 의례 긴 시간을 소모하며 진행했던 데이터 전환 절차를 거치지 않아도 된다. 이를 통해 기업은 훨씬 빠른 시간 내에 더욱 가볍고 강력한 제품을 시장에 선보일 수 있다.

조나스 브로흐먼(Jonas Brochman) 스웨덴 GKN 항공엔진시스템 제조 엔지니어링 사업부 엔지니어링 전문가는 "패싯(Facet)화된 지오메트리는 이제 컨버전트 형태로 인식될 때 시트(Sheet)나 솔리드(solid) 바디로 작용한다는 점은 상당히 유익하다. 패싯(facet)화된 하드웨어 스캔 데이터를 변환하여 제어된 방식으로 연관성을 살려 보완하고 재배치하는 기능은 효율성과 최종 품질을 향상시키는데 매우 큰 역할을 할 것으로 보인다"고 말했다.

Operating electric motors, hydraulic components and electro-hydraulic actuators reliably even under extreme ambient conditions: IndraControl XM for use in marine and offshore applications and in explosive atmospheres.

Robust hardware for extreme environments: IndraControl XM2201

- Rexroth's controller is now certified for use on ships, offshore installations and in explosive atmospheres.

Bosch Rexroth

Six European and American certification boards have approved the IndraControl XM22 control hardware for use on ships and offshore installations even under extreme ambient conditions. The certifications include the control hardware, extension modules for the expansion of the communication interfaces as well as application-specific modules of the fast

IndraControl S20 I/O portfolio. IndraControl XM is the latest powerful controller with IP20 protection. The XM embedded controller uses IEC 61131 compliant programming tools for PLC programs as well as motion control tasks to regulate electric, hydraulic and electro-hydraulic drives.

The environmental conditions on the high seas are already demanding enough, because the technology has to function simply, safely and reliably. This approach has been followed by classification societies for more than 150 years. Their task is to test the robustness and reliability of all components for shipbuilding and offshore operations. A specially optimized version of IndraControl XM, which is widely used in the industry, has now been certified by six classification societies for use on the high seas: the American Bureau of Shipping, Lloyd's Register, Bureau Veritas, Det Norske Veritas / Germanischer Lloyd, Registro Italiano Navale and the Federal Maritime and Hydrographic Agency. The modular and expandable control solution is also certified according to IECEx (protection class Ex ec IIC T4 Gc) for potentially explosive environments and is therefore also suitable, for example, for the switchgear application on oil and natural gas conveying devices.

Proven in extreme environments

This special variant of the IndraControl XM22 uses the same modern processor technology for high performance as the standard versions used in numerous stationary machine industries. The hardware proves itself as a high-performance solution even in applications with extreme ambient conditions, e.g. in metallurgy or wood processing in all climate zones. Selected S20 I/O modules are certified to complement the modular control system for a complete automation system. Application examples include winches, tank ballast systems or drill main drives and drill position handling.

The control modules are approved for an application temperature range from -25 to +60°C. The rugged and shock-resistant electromechanical system can withstand vibrational loads of up to 5 g and impacts of up to 30 g. Both the control electronics and the I/O modules are extremely resistant to EMC influences. The control system, on the other hand, has significantly reduced EMC radiation and thus minimizes effects on other devices in the control cabinet.

Open communication and easy commissioning

For the drive communication, IndraControl XM uses Sercos, a standardized real-time automation bus. Extension modules, which are registered by the certification companies, also extend the communication capabilities by providing data access through protocols such as CAN as master, PROFINET RT or Ethernet / IP as master or slave. This allows the control system to be integrated into the architecture on ships and offshore installations. In line with the high performance requirements at sea, Rexroth also offers certified servo drives of the IndraDrive ML family which cover a system power range of up to 4 MW. Electrohydraulic solutions from Rexroth use the same software kernels and automatically take into account the special features of fluid technology.

With the fastest S20 modules currently available on the market, highly precise control of several synchronous hydraulic axes can be achieved. E.g. for hydraulic control of ship winches, hydraulic proportional valves can be controlled via certified S20 pulse width modules.

IndraControl XM reduces the commissioning times of the hardware and software to a minimum. The I/O modules are installed without tools with pluggable electronics. On the software side, technicians start the control via the First Touch user interface which requires only a standard internet browser.

Bosch Rexroth has a large presence in important maritime hubs as well as at the most important ports of international maritime shipping with service and spare parts capacities on site. The company has been equipping ships and offshore installations with drive and control technology for more than 50 years.

About Bosch Rexroth

Economical, precise, safe, and energy efficient: drive and control technology from Bosch Rexroth moves machines and systems of any size. The company bundles global application experience in the market segments of Mobile Applications, Machinery Applications and Engineering, and Factory Automation to develop innovative components as well as tailored system solutions and services. Bosch Rexroth offers its customers hydraulics, electric drives and controls, gear technology, and linear motion and assembly technology all from one source. With locations in over 80 countries, more than 31,100 associates generated sales revenue of approximately $5.99 billion (5.4 billion euros) in 2015.

극한 환경에 적합한 내구성 높은 하드웨어: IndraControl XM2201

– IndraControl XM은 선박, 해양 설비 및 폭발성 대기환경에서 사용을 위한 선급 인증들을 취득했다.

보쉬렉스로스

유럽, 미국 등 6곳의 선급협회는 극한 환경 조건에서도 선박 및 해상 설치에 사용할 수 있도록 IndraControl XM22 제어 하드웨어를 인증했다. 이 인증은 제어 하드웨어, 통신 인터페이스의 확장을 위한 확장 모듈뿐만 아니라 고속 IndraControl S20 I/O 포트폴리오의 용도별 모듈도 포함되어 있다. IndraControl XM은 IP20 보호를 제공하는 최신의 강력한 컨트롤러다. XM 임베디드 컨트롤러는 PLC 프로

그램용 IEC 61131 호환 프로그래밍 도구를 사용해 전기, 유압 및 전기-유압 구동식 드라이브를 제어하는 모션 제어 작업에 적합하다.

공해에서의 환경 조건은 이미 충분히 까다롭다고 알려져 있기 때문에, 기술은 간단하고, 안전하며, 신뢰성 있게 기능을 발휘해야 한다. 이런 접근은 150년 이상 동안 선급협회에서 사용해왔다. 선급협회의 업무는 조선과 해양 운영에서 모든 구성품의 내구성과 신뢰성을 시험하는 것이다. 산업에서 널리 사용하는 IndraControl XM의 특별하게 최적화된 버전은 공해에서 사용에 대해 6개 선급협회로부터 인증을 받았다. 선급 협회는 ABS, LR, BV, DNV GL, RINA 및 Federal Maritime과 Hydrographic Agency 등이 있다.

또한 석유와 천연가스 이송 장치의 스위치 기어 용도에도 적합하다. IndraControl XM은 모듈식으로 확장 가능한 제어 솔루션도 폭발성 환경에 대해 IECEx(보호 등급 Ex ec IIC T4 Gc) 인증도 취득했다.

극한 환경에서 검증

IndraControl XM22는 많은 기계 산업에 사용하는 표준 버전과 동일한 고성능 현대식 프로세서 기술을 사용한다. 하드웨어는 극한 주변 조건의 용도(예: 모든 기후대에서 야금 또는 목재 가공)에서도 고성능 솔루션이라는 것이 입증됐다. 선택된 S20 I/O 모듈은 완전 자동화 시스템을 위한 모듈식 제어 시스템을 보완한다는 것이 검증됐다. 적용 사례는 윈치, 탱크 밸러스트 시스템 또는 드릴 메인 드라이브와 드릴 위치 조정을 포함한다.

제어 모듈은 –25~+60°C 범위의 용도에 대해 인증을 받았다. 높은 내구성의 내충격성 전자기계 시스템은 최대 5g의 진동 부하 및 최대 30g의 충격을 견딜 수 있다. 제어 전자장치와 I/O 모듈은 EMC 영향에 대한 저항이 매우 크다. 한편 전자 시스템은 EMC 복사를 크게 줄여 제어 캐비닛에서 다른 장치에 미치는 영향을 최소화한다.

개방 통신 및 쉬운 시운전

드라이브 통신의 경우, IndraControl XM은 표준화된 실시간 자동화 버스인 Sercos를 사용한다. 인증 기업이 등록하는 확장 모듈도 CAN을 마스터로 사용하거나 PROFINET RT 또는 이더넷 / IP를 마스터 또는 슬레이브로 사용하는 프로토콜을 통해 데이터 액세스를 제공해 통신 성능이 확장됐다. 이런 방식으로 제어 시스템은 선박과 해양 설비의 아키텍처에 통합할 수 있다. 해상에서 고성능 요구사항에 따라, 보쉬렉스로스는 최대 4MW의 시스템 출력 범위를 포함하는 IndraDrive ML 계열의 인증된 서보 드라이브도 제공한다. 전기 유압식 솔루션의 경우, 동일한 소프트웨어 커널을 사용하며 유체 기술의 특수 기능을 자동으로 고려한다.

현재 시장에서 구입할 수 있는 가장 빠른 S20 모듈을 사용하면 여러 동기식 유압 축의 고정밀 제어를 달성할 수 있다. 예를 들어, 선박 윈치의 유압 제어에서 유압 비례 제어 밸브는 인증된 S20 펄스 폭 모듈을 통해 제어할 수 있다.

IndraControl XM은 하드웨어와 소프트웨어의 시운전 시간을 최소로 줄인다. I/O 모듈은 공구 없이 장착 가능한 전자장치에 설치한다. 소프트웨어 측면에서 기술자는 표준 인터넷 브라우저만 필요한 First Touch 사용자 인터페이스를 통해 제어할 수 있다.

About 보쉬렉스로스

경제적이고 정확하며, 안전하고 에너지 효율적인 보쉬렉스로스의 드라이브 및 제어 기술은 전산업분야에 활용되고 있다. 보쉬렉스로스는 모바일 응용 프로그램, 기계 응용 프로그램 및 엔지니어링, 공장 자동화 분야의 글로벌 리더로서 혁신적인 제품 및 맞춤형 시스템 솔루션, 그리고 서비스까지 포괄한다. 보쉬렉스로스는 고객에게 유압 장치, 전기 구동 장치 및 제어 장치, 기어 기술 및 선형 모션 및 조립 기술을 모두 원 소스로 제공하고 있다. 현재 80여 국가에 지사를 두고 있으며 31,100명 이상의 직원이 근무하고 있다. 2015년 기준 약 59.9억 달러(54억 유로)의 매출을 기록했다.

HHI signed $ 800 Million order to Build 10 VLOCs with Polaris Shipping

At the signing ceremony, Chung Ki-sun, Executive Vice President of Corporate Planning Office of HHI is shaking hands with Kim Wan-jung, CEO of Polaris Shipping.

Hyundai Heavy Industries (HHI) announced that it signed a $800 Million worth contract to build ten 325,000 dwt VLOCs (Very Large Ore Carrier) with Polaris Shipping, the domestic dry bulk owner and operator, on September 25. The contract is the largest single order in the last five years since HHI received an order of ten large-sized containerships from a Greek shipping company in 2012.

The signing ceremony held at HHI's Seoul office, was attended by Ka Sam-hyun, COO of HHI Group Ship Sales Division; Chung Ki-sun, Executive Vice President of Corporate Planning Office of HHI; and Kim Wan-jung, CEO of Polaris Shipping.

The ships, measuring 340m in length, 62m in width and 29.8m in height, will be designed as eco-friendly ships applying LNG Ready design to meet environmental regulations and reduce fuel consumption, and equipped with a ballast water treatment system and a desulfurization equipment scrubber. The vessels are scheduled to be delivered by 2021.

An HHI official said, "Even under unfavorable market conditions, we have proven our competitiveness with a big order contract in five years. We are beefing up our marketing efforts to meet clients' needs on the back of our eco-friendly technologies."

HHI Group has received a total of 20 orders to build vessels from Polaris Shipping, and delivered seven vessels including four 250,000 ton VLOCs ordered in 2013 so far.

The total number of ships HHI Group won so far this year is 99 ships worth $5.8 billion, which is a 500% plus increase for the comparable period last year when it clinched 20 ships worth $2 billion.

현대중공업, VLOC 10척 8억 달러 수주

현대중공업은 최근 폴라리스쉬핑(Polaris Shipping)와 325,000톤급 초대형 광석운반선(VLOC: Very Large Ore Carrier) 10척에 대한 수주 계약을 체결했다고 지난 9월 26일 밝혔다. 이번 수주는 지난 2012년 현대중공업이 그리스 선주사로부터 초대형 컨테이너선 10척을 수주한 이래 단일계약 기준으로 5년 만에 최대 규모다.

이날 계약식은 서울 계동 현대빌딩에서 폴라리스쉬핑 김완중 회장, 현대중공업 그룹선박해양영업본부 가삼현 사장, 정기선 전무 등이 참석한 가운데 진행됐다. 폴라리스쉬핑은 최근 세계 최대 광산 업체인 발레(Vale)와의 용선계약을 배경으로 VLOC 10척에 대한 발주를 진행했다. 업계에 따르면 발레사는 선대 개편 목적 및 철광석 수출 확대를 위해 한국 및 중국 해운사들과 약 30척에 달하는 장기 용선계약에 대한 막바지 논의를 이어나가고 있는 걸로 알려져 있다.

이 선박은 길이 340m, 폭 62m, 높이 29.8m로, 2021년까지 순차적으로 인도될 예정이다. 특히 환경규제에 대응하고 연료를 절감할 수 있도록 설계된 LNG Ready 디자인이 적용됐으며, 평형수처리장치, 탈황설비인 스크러버(Scrubber) 등을 탑재한 친환경 선종이다.

폴라리스쉬핑 관계자는 "현대중공업으로부터 인도해 운용중인 선박에 대한 만족도가 높다"며 "연료 절감 및 친환경 분야에서 뛰어난 기술력을 갖고 있는 현대중공업에 다시 발주를 하게 됐다"고 밝혔다.

현대중공업그룹은 2013년 25만톤급 초대형 광석운반선 4척을 시작으로 7척의 선박을 성공적으로 인도했으며, 이번 수주까지 약 20척 규모를 폴라리스쉬핑으로부터 수주하며 신뢰를 쌓아왔다.

현대중공업 관계자는 "어려운 수주 환경 속에서 5년 만에 단일 계약 척수로는 최대치를 기록하며 현대중공업그룹의 경쟁력을 입증하는 계기가 됐다"며, "현대중공업만의 친환경 · 고품질 선박 기술력을 바탕으로 영업 활동에 적극 나설 계획"이라고 말했다.

한편, 현대중공업그룹 조선3사는 이번 계약으로 지금까지 99척, 총 58억 달러의 수주 계약을 체결, 지난해 같은 기간 대비(20척, 20억 달러) 척수 기준으로 약 5배 증가한 실적을 기록했다.

SHI win an order for LNG-FSRU

Samsung Heavy Industries (SHI) won an order to build a LNG-FSRU (Floating Storage and Regasification Unit) for about KRW 250 billion.

SHI revealed on 19th a newbuild order for a 170,000m^3 LNG-FSRU received from a consortium of Marubeni, Sojitz, and Pertamina. LNG-FSRU is a specialized vessel-like facility that regasifies LNG offshore and supply it directly to onshore demand.

The latest FSRU from SHI will be equipped with Samsung's newly developed in-house regasification system, The S-Regas (GI). The regasification system is one of main equipment for FSRUs. S-Regas (GI) reduces chance of corrosion from traditional method of heating LNG directly with seawater, and is another energy efficient solution from SHI saving energy by 5%. SHI earlier showcased the system in September to 19 ship-owner companies.

SHI representative said "Successful showcase of the In-house regasification system led to an actual application in the new LNG-FSRU in just a month." He explained "cost savings and improvement in quality and schedule management from the in-house regasification system led to a competitive edge." He added "SHI will continue to lead LNG-FSRU market with unyielding efforts to meet customer needs such as low operating costs and reliable operability."

삼성중공업, LNG-FSRU 1척 수주

삼성중공업이 2,500억원 규모의 LNG-FSRU(Floating Storage and Regasification Unit, 부유식 액화천연가스 저장 재기화 설비) 1척을 수주했다. 지난 10월 18일 마루베니(Marubeni), 소지쯔(Sojitz), 페르타미나(Pertamina) 컨소시엄과 170,000m^{3}급 LNG-FSRU 건조계약을 체결했다.

LNG-FSRU는 해상에서 LNG를 천연가스를 기화한 뒤 육상의 소비처에 직접 공급할 수 있는 선박 형태의 설비다. 이번에 수주한 LNG-FSRU에는 삼성중공업이 독자 기술로 개발, 국산화한 새로운 LNG 재기화시스템인 'S-Regas(GI)'이 탑재될 예정이며, 재기화시스템은 LNG-FSRU의 핵심장비다.

글리콜(Glycol) 혼합액을 이용해 LNG를 기화시키는 S-Regas(GI)는 해수로 LNG를 직접 가열해 기화시키는 종전 방식에 비해 부식 우려가 적고, 재기화에 사용되는 에너지도 5% 이상 절감할 수 있는 친환경 시스템이다. 삼성중공업은 지난 9월 국내외 19개 선주사 관계자들을 대상으로 S-Regas(GI) 실증설비 시연회를 개최한 바 있다.

삼성중공업 관계자는 "새로운 재기화시스템의 우수한 성능과 안전성을 발주처로부터 인정받은 결과 시연회를 개최한 지 한달 만에 실제 LNG-FSRU에 적용하는 성과를 거뒀다"면서 "비용절감과 품질, 납기관리능력 향상 등 재기화시스템 국산화 독자 개발에 따른 효과가 수주 경쟁력으로 이어진 결과"라고 설명했다.

Exmar FSRU Locks In For Longevity With Ecolock Protection

Subsea Industries has applied its hard-type Ecolock protective coating to the hull of a 26,320m^3 floating storage and regasification (FSRU) unit nearing completion at a shipyard in Nantong, China.

It is the second major coatings project Subsea Industries has completed in China for Exmar.

Following the company's approach to applying hard coating technology to its barge-type floating assets, in combination with the success of the 2013 Ecospeed

application to the 16,100m^3 Caribbean FLNG unit, the decision was made to specify Ecolock for the entire hull of the newbuild FSRU.

The experience of the shipyard gained from the Caribbean FLNG application – the first time it had applied a Subsea Industries' product – resulted in the hard coating being applied more quickly. Like the first project, the FSRU was built in blocks which were coated prior to assembly. Weld seams and inaccessible areas were coated after the unit was assembled.

Manuel Hof, Subsea Industries' production executive added "The shipyard was very satisfied with the coating, due to the ease and speed of application as well as the quality of the coating. I am told that had the hull been coated with a traditional coating system it would have taken at least seven days from surface preparation to the final coat. The yard was able to apply two coats in a single day, which minimised the risks associated with multi-layer applications. It also saved the yard time and labour costs."

Ecolock is single, homogenous protective covering for static steel structures that provides asset owners with a tough, durable coating designed to remain intact throughout the vessel's life without drydocking, repair or replacement.

"The glass-flake reinforced coating is ideally suited to this kind of application," said Hof. "Combined with long-term protection, the coating can be cleaned underwater without any damage to the coating. As long as correctly applied and maintained, Ecolock can be guaranteed for up to 20 years for this type of application. This puts it in a league of its own."

Exmar has opted for Subsea Industries' hard coating technology for its barge-type floating assets.

Prior to application, preparation work has to be carried out to ensure a structural profile of at least 75µm (SA2.5 or better). Ecolock is then applied but requires no primer or other type of coating. Typically, just two 500µm coats are applied with minimum curing time of three hours between each application.

Shortly after the Ecolock application, the FSRU was floated out for completion of the topsides installation and pre-commissioning of the unit.

Abu Dhabi's Nasr II Oil Field to be Powered by 3,000 km of Nexans Cables

The Nasr field is a large oil field located approximately 130 km northwest off the coast of Abu Dhabi City in United Arab Emirates. In the framework of the Nasr Phase II Full Field Development Project, aimed at almost tripling the field's oil production capacity to 65,000 barrels per day, Nexans was selected by the EPC contractor Hyundai Heavy Industries (HHI) as the sole cable supplier for the second and most crucial package of the project.

Abu Dhabi's Nasr II Oil Field to be Powered by 3,000 km of Nexans CablesThe second package of the Nasr Phase II Full Field Development Project involves the installation of a multi-platform super complex integrating a gas treatment platform, a separation platform, an accommodation platform, utilities, flares, and bridges. All engineering, procurement, construction, installation and commissioning work is carried out by HHI who chose to power the new complex with Nexans' full range of cables from 250 V to 132 kV power cables, instrumentation cables and communication cables.

Nexans Kukdong will supply a total of 3,000 km of medium (MV) and low voltage (LV) cables and instrumentation cables, which equals to almost one quarter of the Earth's diameter in length. Nexans cables fully meet the customer specifications as well as the strictest IEC, BS and NEK standards and include several innovations, such as fire resis-

tance with water spray for all fire type instrumentation cables, enhanced foundation fieldbus cable with oil resistance, and HYPRON® cabling solutions with lead-free sheath applied to LV/MV (250 V to 32 kV) cables and instrumentation cables.

In September 2015, Nexans had already been awarded the first cable supply contract by HHI for delivery of 132 kV XLPE insulated three-core subsea power cable for the first phase of the Nasr Oil Field project. The cable is manufactured at Nexans specialized facility in Halden, Norway and will be delivered to Hyundai Heavy Industries in 2017.

"We feel honoured that Hyundai Heavy Industries have chosen Nexans' solutions and entrusted us once again with a contract for full cable supply for this large-scale project," said Julien Hueber, CEO of Nexans Kukdong. "This success is undoubtedly the result of dedication and cooperation of our team as well as our commitment to client service."

The MV/LV power cables and instrumentation cables for the second phase of the offshore project will be produced at Nexans plant in Jincheon, Korea for the completion of construction in the HHI shipyard by June 2018.

아부다비 나스르 Ⅱ 해상 유전, 넥상스의 3,000km 케이블로 운영 예정

나스르 유전은 UAE의 아부다비에서 북서쪽으로 약 130km 떨어진 곳에 위치한 대규모 유전이다. 현재 생산량의 거의 3배에 달하는 일일 생산량 65,000배럴을 생산목표로 하는 나스르 Ⅱ 프로젝트에서 EPC 업체로 낙찰 된 현대 중공업은 넥상스를 유일한 케이블 공급업체로 선택했다.

나스르 Ⅱ는 유전개발에 필요한 원유분리시설, 가스처리 시설, 거주 플랫폼, 기초구조물과 연결구조물을 포함하는 종합 유전개발 프로젝트이다. 현대 중공업은 설계, 구매, 건조, 설치 및 시운전을 하게 되며 이 거대한 구조물은 250kv부터 132kv에 이르는 전력전선, 인필드 케이블, 계장용 전선, 통신용 전선 등 모든 넥상스의 전선으로 운영된다.

넥상스 그룹사인 극동전선은 지구 둘레의 4/1에 해당하는 3,000km의 저압 및 고압 전력전선, 계장용 전선 및 통신 케이블을 공급하며, 모든 케이블은 IEC, BS와 NEK 등 까다로운 국제 규격에 맞는 제품이다. 이번에 납품하는 넥상스 제품에는 워터 스프레이 테스트를 통과한 내화 전선 및 오일에 강한 필드버스 케이블 그리고 납이 안 들어간 하이프론 솔루션까지 혁신적인 제품이 포함되어 있다.

현대중공업은 이미 2015년 9월에 넥상스와 나스르 프로젝트에 설치 될 해저케이블, 즉 세 회선의 132kV의 XLPE 절연 삼상 케이블 공급 계약을 체결했고, 이 특수 해저케이블은 노르웨이 할덴에 위치한 넥상스 해저케이블 전문공장에서 제조 공급될 예정이다.

"현대중공업이 대규모 종합유전 개발 프로젝트에 다시 한번 넥상스 케이블을 선택해서 매우 자랑스럽다. 성공 요인은 우리 임직원들이 한마음으로 헌신하고 고객서비스에 최선을 다했기 때문이다"라고 극동전선의 줄리앙 위버 대표이사는 말했다. 저압 및 고압 전선은 한국의 넥상스 진천 공장에서 생산되어 현대중공업 납품되며 현대는 내년 6월에 나스르 Ⅱ 해상 프로젝트를 완공할 예정이다.

LS Cable & System supplied subsea cables to offshore wind farm

LS Cable & System announced that it recently completed supply of submarine cables to the first-ever offshore wind farm in the United States. The wind farm was built off the coast of Block Island, the State of Rhode Island, by National Grid, a power grid operator in the eastern United States, and Deepwater Wind, an offshore wind power specialist.

LS Cable & System signed contracts worth USD 74 million (about KRW 8.4 billion) in all with those companies in February 2015 for supply and installation of submarine cables. Submarine cables are used for transmission among wind power generators or between wind farms and onshore substations.

The cables supplied by LS Cable & System have a total length of 45 km and weight of 3,200 tons. It took 1 year for manufacture and transportation of submarine cables in the plant located at Donghae City, Gangwon Province, and took more than 2 years to complete installation of the cables.

An official from LS Cable & System said, "Offshore wind power has been steadily increasing in the United States, but the country has total reliance on imported submarine cables due to absence of submarine cable manufacturer. The successful

grid connection to the offshore wind farm, the first of its kind in the United States, will serve as a stepping stone for increased involvement in projects in the United States."

Offshore wind turbines can generate more power than onshore wind turbines and reduce environmental damage and nose. For that reason, offshore wind power generation has been expanding mainly in Europe and North America. LS Cable & System has supplied submarine cables to offshore wind farms in the U.K., Netherlands, Belgium, etc.

LS전선, 해상풍력단지에 해저케이블 공급

LS전선은 최근 미국 최초의 해상 풍력발전단지에 해저케이블 공급을 완료했다고 밝혔다. 미국 동부지역 전력망 운영사인 내셔널 그리드(National Grid)와 해상풍력발전 전문시행사인 딥워터 윈드(Deepwater Wind)가 로드아일랜드 주 블록섬(Block Island) 앞바다에 건설한 풍력발전단지이다.

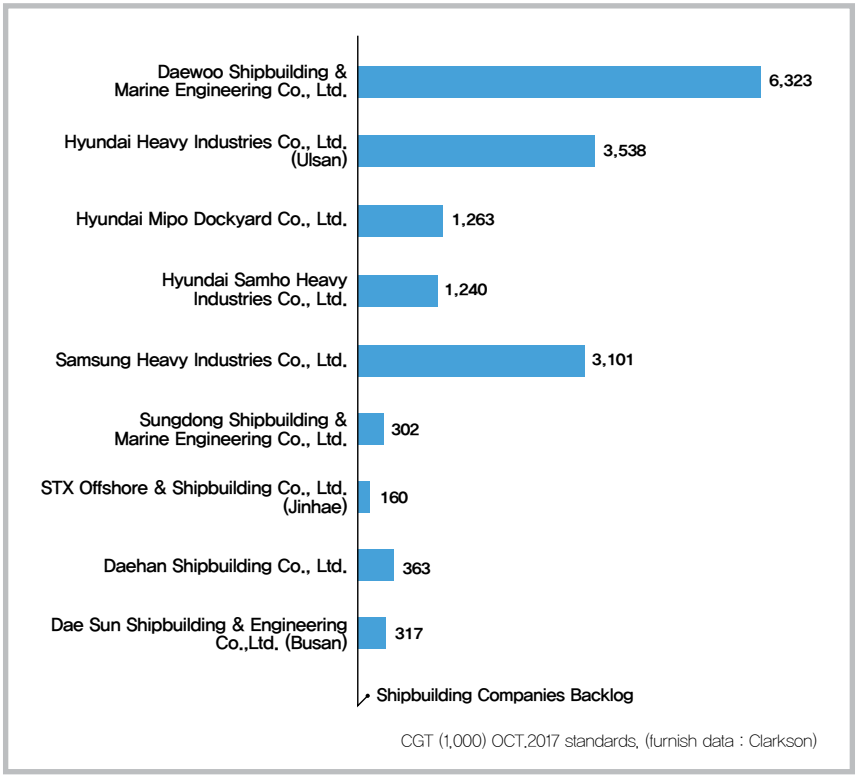
LS전선은 지난 2015년 2월, 이들 회사들과 총 7400만 달러(약 840억 원) 규모의 해저케이블의 공급, 설치 계약을 체결했다. 해저케이블은 풍력 발전기들 간 또는 풍력발전단지와 육지 변전소 간 송전에 사용된다.

LS전선이 공급한 케이블은 총 연장 길이 45km에 무게가 3,200톤에 이른다. LS전선이 강원도 동해시 해저케이블 전문공장에서 생산하고 운송하는 데만 1년, 최종 설치까지 총 2년 이상이 소요되었다.

LS전선 관계자는 "미국은 해상풍력이 점차 늘고 있으나 해저케이블은 생산 업체가 없어 전량을 수입한다"며, "이번 미국 첫 해상풍력단지의 전력망 연계를 성공적으로 수행함으로써 향후 미국 내 사업 참여 기회가 확대될 것으로 기대한다"고 말했다.

해상풍력은 지상풍력에 비해 발전량이 많으며, 환경파괴와 소음공해도 적어서 유럽과 북미를 중심으로 확산 추세에 있다. LS전선은 영국과 네덜란드, 벨기에 등의 해상풍력발전단지에 해저케이블을 공급했다.

Korean shipyards claimed global top spot in monthly new order intake in 3 months. According to Clarkson, new orders at Korean shipyards stood at 130,000 CGT (9 vessels) in August this year. Global order placement showed an one-third decrease to 510,000 CGT (33 vessels) from the previous month (157,000 CGT with 44 vessels). Chinese shipyards and Japanese shipyards took the second spot and third spot, respectively, with 110,000 CGT (7 vessels) and 40,000 CGT (2 vessels).



Cumulative global orders up to the previous month stood at 12.73 million CGT (489 vessels), increasing by 3.70 million CGT compared to the same period of the previous year (9.03 million CGT with 404 vessels). By country, Chinese shipyards claimed the top spot with 4.22 million CGT (195 vessels) and Korean shipyards took the second spot with 3.48 million CGT (104 vessels). Japanese shipyards took the third spot with 1.09 million CGT (58 vessels).

Price for ultra-large containership with a capacity of 16,000 TEU or higher, which is the flagship vessel of Korean shipyards, and newbuilding price for 174,000m^3 LNG carriers slid by USD 1 million apiece. Meanwhile, Clarkson Newbuilding Price Index hit 124 points in August, rising by 1 point in a month.

Here, we take a close look at the performance of major domestic shipyards, the world's leading players with strong growth in new orders as shown currently in the Clarkson data, such as Hyundai Heavy Industries (HHI), Daewoo Shipbuilding & Marine Engineering (DSME), Samsung Heavy Industries (SHI) and others based on the order backlog data.

Photo: Daewoo Shipbuilding & Marine Engineering Co., Ltd.

Korea Shipbuiling Orders awarded to domestic shipyards in 2015~2017

Data		Type	Number of vessel	Amount	Ship owner	Delivery	Shipyard
2015	Jan	174,000m³ LNG carriers	2 vessels	USD 400 million	Korea Line Corporation, Korea	The end of 2017	Daewoo Shipbuilding & Marine Engineering
		174,000m³ LNG carriers	2 vessels	USD 400 million	Hyundai LNG Shipping, Korea	The end of 2017	Daewoo Shipbuilding & Marine Engineering
		19,200 TEU container ships	3 vessels	USD 450 million	Scorpio Group, Monaco	-	Samsung Heavy Industries
		LNG carriers	2 vessels	USD 416 million	SK shipping, Korea	The end of 2017	Samsung Heavy Industries
		319,000 DWT VLCCs	2 vessels	USD 198 million	Maran Tankers Management, Greece	-	Daewoo Shipbuilding & Marine Engineering
	Feb	158,000 tons oil tankers	5 units (2 optional vessels)	USD 330 million	-	2017s	Sungdong Shipbuilding & Marine Engineering
		174,000m³ LNG carriers	1 vessel	USD 200 million	-	-	Daewoo Shipbuilding & Marine Engineering
		74,000 DWT oil products carriers	2 units (1 optional vessels)	USD 46 million	Valles Steamship, Hong Kong	-	STX Offshore & Shipbuilding
		300,000 DWT VLCCs	2 vessels	USD 192 million	Metrostar Management, Greece	The end of 2016	Hyundai Heavy Industries
		1,800 TEU container ships	4 units (2 optional vessels)	-	Cosmoship Management S.A, Greece	-	Dae Sun Shipbuilding & Engineering
		180,000m³ LNG carriers	1 vessel	-	Mitsui O.S.K Lines, Japan	2018s	Daewoo Shipbuilding & Marine Engineering
	Mar	38,000m³ liquefied petroleum gas and ammonia carriers	2 vessels	-	Asian ship owner	-	Hanjin Heavy Industries & Construction
		20,100TEU container ships	4 vessels	USD 619.57 million	Mitsui O.S.K Lines, Japan	2017. August	Samsung Heavy Industries
		LR1 tankers	2 vessels	KRW 320 billion	BW, Singapore	2016 ~ 2017	STX Offshore & Shipbuilding
	Apr	319,000 DWT VLCCs	2 vessels	USD 198 million	Maran Tankers Management, Greece	The end of 2016	Daewoo Shipbuilding & Marine Engineering
		20,600 TEU container ships	3 vessels	-	CMA CGM, France	The end of 2017	Hanjin Heavy Industries & Construction (HHIC)-Phil's Subic Shipyard
		21,100 TEU container ships	6 vessels	USD 950 million	OOCL, Hong Kong	The end of 2017	Samsung Heavy Industries
		10,500 TEU container ships	5 vessels	-	Hapag-Lloyd, Germany	-	Hyundai Samho Heavy Industries
		Pure Car/Truck Carriers	2 vessels	USD 130 million	Norwegian Car Carriers, Norway	The end of 2016	Hyundai Samho Heavy Industries
		11,000 TEU container ships	6 vessels	-	Asian and European ship owners	2016 ~ 2017	HHIC-Phil's Subic Shipyard
	May	156,000 tons oil tankers	2 vessels	-	Maran Tankers Management, Greece	-	Daewoo Shipbuilding & Marine Engineering
		5,200 ton training vessel	1 vessel	-	-	-	Hanjin Heavy Industries & Construction
		74,000 tons LR1 tankers	8 units (4 optional vessels)	USD 375 million	Marshall Islands-based ship owners	The end of 2016	STX Offshore & Shipbuilding
	Jun	300,000 DWT VLCCs	10 units (5 optional vessels)	USD 1 billion	The National Shipping Company of Saudi Arabia	2017s	Hyundai Samho Heavy Industries
		19,630 TEU container ships	11 vessels	USD 1.1 billion	Maersk Line A/S, Denmark	2018s	Daewoo Shipbuilding & Marine Engineering
		Tankers	2 vessels	-	Arcadia Shipmanagement, Greece	-	Hyundai Heavy Industries
		300,000 DWT VLCCs	6 units (4 optional vessels)	USD 540 million	John Fredriksen	-	STX Offshore & Shipbuilding
		174,000 CBM LNG carriers	3 units (1 optional vessels)	-	Teekay LNG Partners, Canada	First quarter of 2019	Hyundai Samho Heavy Industries
		155,000 DWT tankers	3 vessels	USD 330 million	-	2018. February	Samsung Heavy Industries
		84,000m³ VLGCs	4 vessels	USD 320 million	China Peace, China	-	Daewoo Shipbuilding & Marine Engineering
	Jul	173,400m³ LNG Carriers	1 vessel	USD 195 million	Chandris, Greece	The end of 2018	Daewoo Shipbuilding & Marine Engineering
		14,000 TEU container ships	9 vessels	USD 1.1 billion	Maersk Line A/S, Denmark	2017	Hyundai Heavy Industries
	Aug	Product Carriers	4 vessels	USD 144 million	Scorpio Tankers, U.S.A	The first of 2017	Hyundai Mipo Dockyard
	Sep	84,000m³ LPG Carriers	2 vessels	-	Asia ship owner	2017s	Daewoo Shipbuilding & Marine Engineering
		74,000 tons LR1 tankers	4 units (2 optional vessels)	-	Greece ship owner	The second half of 2017	STX Offshore & Shipbuilding
	Oct	173,400m³ LNG Carriers	2 vessels	USD 400 million	BW Group, Singapore	The first half of 2019	Daewoo Shipbuilding & Marine Engineering
		84,000m³ LPG carriers	2 vessels	-	Asia ship owner	2017s	Daewoo Shipbuilding & Marine Engineering
	Nov	319,000 tons VLCCs	2 vessels	-	Maran Tankers Management, Greece	2017s	Daewoo Shipbuilding & Marine Engineering
	Dec	114,000 tons products carriers	2 vessels	-	Sea Tankers Group	2017. September	Daehan Shipbuilding
	Feb	158,000 DWT oil products carriers	2 vessels	-	Ditas Shipping, Turkey	2018s	Hyundai Heavy Industries
	May	40,000 DWT products carriers	2 vessels	-	Greece ship owner	-	Hyundai Mipo Dockyard
		159,000 DWT oil tankers	2 vessels	-	AMPTC, Kuwait	2018s	Hyundai Heavy Industries

	Jun	75,000 tons product carriers	4 vessels	USD 170 million	Tsakos, Greece	The first of 2018	Sungdong Shipbuilding & Marine Engineering
		180,000m³ LNG carriers	2 vessels	USD 400 million	SK E&S, Korea	The first of 2019	Hyundai Heavy Industries
		50,000 tons bulk carrier	1 vessels	-	Ilshin Marine Transport, Korea	The end of 2017	Hyundai Mipo Dockyard
	Jul	31,000 tons Car ferry	1 vessels	-	Weidong Ferry	The end of 2018	Hyundai Mipo Dockyard
	Sep	180,000m³ LNG carriers	2 vessels	USD 367 million	Europe ship owner	-	Samsung Heavy Industries
	Oct	2,800 ton convoy	1 vessel	USD 297 million	Korean Navy	The end of 2020	Daewoo Shipbuilding & Marine Engineering
		2,600 ton frigates	2 vessels	USD 324 million	Department of National Defense, Philippines	2020s	Hyundai Heavy Industries
		Patrol killer medium	3 vessels	USD 173 million	Korean DAPA	2019s	Hanjin Heavy Industries & Construction
		157,000 DWT oil tankers	2 vessels	USD 220 million	Viken, Norway	-	Samsung Heavy Industries
		113,000 DWT oil tankers	2 vessels				
		157,000 DWT oil tankers	3 vessels	USD 170 million	Nordic American Tankers Limited, Norway	-	Samsung Heavy Industries
	Dec	14,500 TEU container ships	4 vessels	USD 700 million	IRISL, Iran	2th quarter 2018	Hyundai Heavy Industries
		49,000 tons products carriers	6 vessels				Hyundai Mipo Dockyard
		LNG Bunkering Vessel	1 vessel	-	Bernhard Schulte, Germany	The end of 2018	Hyundai Mipo Dockyard
2017	Jan	114,000 tons product carriers	2 vessels	-	SFL, France	3th quarter of 2019	Daehan Shipbuilding
		50,000 tons oil tankers	1 vessel	-	Fukujin Kisen, Japan	-	Hyundai Mipo Dockyard
	Feb	RO-RO Ship	2 vessels	USD 117.8 million	CLdN, Luxembourg	The first of 2017	Hyundai Mipo Dockyard
		50,000 DWT product carriers	1 vessel	-	Greece ship owner	-	Hyundai Mipo Dockyard
		300,000 DWT VLCCs	2 vessels	-	Enesel, Greece	The end of 2018	Hyundai Heavy Industries
	Mar	173,400m³ LNG carriers	2 vessels	-	Europe ship owner	The end of 2019	Daewoo Shipbuilding & Marine Engineering
		114,000 tons oil tankers	4 vessels	USD 240 million	Sovcomflot, Russia	3th quarter of 2018	Hyundai Samho Heavy Industries
		21,000m³ LPG carriers	2 vessels	-	Solvang ASA, Norway	2019s	Hyundai Samho Heavy Industries
	Apr	VLCCs	1 vessel	-	Neda Maritime, Greece	2019s	Hyundai Samho Heavy Industries
		318,000 tons VLCCs	3 vessels	USD 250 million	Maran Tankers Management, Greece	2018s	Daewoo Shipbuilding & Marine Engineering
	May	300,000 DWT VLCCs	2 vessels	-	Sentek Marine, Singapore	The first of 2019	Hyundai Samho Heavy Industries
		VLCCs	4 vessels	-	Oceania ship owner	The first of 2019	Samsung Heavy Industries
		11,200 DWT product oil & chemical tanker	3 vessels	-	Korea ship owner	The end of 2018	STX Offshore & Shipbuilding
		7,500m³ LNG carriers	2 vessels	USD 100 million	Korea Line, Korea	The end of 2019	Samsung Heavy Industries
	Jun	114,000 DWT oil tankers	2 vessels	-	Metrostar Management, Greece	The end of 2018	Daehan Shipbuilding
		RO-RO Ship	2 vessels	USD 117.8 million	CLdN, Luxembourg	The end of 2019	Hyundai Mipo Dockyard
	Jul	318,000 tons VLCCs	4 vessels	-	Maran Tankers Management, Greece	-	Daewoo Shipbuilding & Marine Engineering
	Aug	84,000m³ LPG carriers	2 vessels	-	Vitol	The first of 2019	Hyundai Heavy Industries
	Sep	300,000 tons VLCCs	5 vessels	USD 420 million	Hyundai Merchant Marine, Korea	The first of 2019	Daewoo Shipbuilding & Marine Engineering
		81,000 DWT bulk carriers	4 vessels	USD 120 million	Bahri, Saudi Arabia	The first of 2020	Hyundai Mipo Dockyard
		325,000 tons VLCCs	10 vessels	USD 800 million	Polaris Shipping, Korea	The first of 2021	Hyundai Heavy Industries
	Oct	325,000 tons VLCCs	5 vessels	USD 400 million	Polaris Shipping, Korea	The first of 2021	Hyundai Heavy Industries

*Note : Based on the press release and public announcements of each shipyards, internal estimation of Monthly KORSHIP (estimation until Oct 15, 2017)

Offshore plant orders awarded to domestic shipyards in 2011-2017

Data		Type	Number of vessel	Amount	Ship owner	Delivery	Shipyard
2011	Jul	Drillship	2 vessels	USD 1.1225 billion	Maersk, Denmark	July 2014	Samsung Heavy Industries
	Aug	LNG-FSRU	1 vessel	USD 280 million	Excelerate Energy, U.S.A	First quarter of 2014	Daewoo Shipbuilding & Marine Engineering
	Sep	Semi-submersible Rig	2 units	USD 1.1 billion	Songa Offshore, Norway	Second hallf of 2014	Daewoo Shipbuilding & Marine Engineering
		Well Intervention Vessel	2 vessels	USD 420 million	Eide Marine Services AS, Norway	2013	STX Finland
		Drillship	1 vessel	KRW 600 billion	Noble Drilling, U.S.A	Second half of 2014	Hyundai Heavy Industries
	Oct	Fixed Offshore Platform	-	USD 1.4 billion	Chevron, U.S.A	Second half of 2014	Daewoo Shipbuilding & Marine Engineering
		Drillship	1 unit	USD 550 million	Offshore drilling company, Americas	-	Daewoo Shipbuilding & Marine Engineering
		Platform Supply Vessel	1 unit	-	Troms Offshore Supply AS, Norway	First half of 2013	STX OSV
		Offshore Plant Module	2 units	-	-	From 2013 to 2014	STX OSV
		Platform Supply Vessel	4 units	KRW 2 trillion	Island Offshore, Norway	Consecutively from the 3rd quarter	of 2013 to the 1st quarter of 2014
	Nov	Pipe Laying Support Vessel	2 units	USD 500 million	Odebrecht, Brazil	August of 2014	Daewoo Shipbuilding & Marine Engineering
	Dec	Offshore facilities (Gas platform and various facilities)	-	USD 900 million	Major multinational oil companies	2nd half of 2014	Hyundai Heavy Industries
2012	Jan	CPF (Central Processing Facility)	-	KRW 2.6 trillion	INPEX, Australia	4th quarter of 2015	Samsung Heavy Industries
		Semi-submersible rig	1 unit	USD 620 million	Odfjell, Norway	by mid 2014	Daewoo Shipbuilding & Marine Engineering
	Feb	LNG-FSRU	-	-	Hoegh, Norway	-	Hyundai Heavy Industries
	Mar	Offshore Platform	1 unit	USD 560 million	DONG E&P A/S, Danish	April 2015	Daewoo Shipbuilding & Marine Engineering
		FPSO	1 unit	USD 2.0 billion	INPEX, Australia	April 2016	Daewoo Shipbuilding & Marine Engineering
	Apr	Drillship	1 vessel	USD 645 million	Ensco plc	Third quarter 2014	Samsung Heavy Industries
	May	Semi-submersible Drilling Rig	2 units	USD 1.1 billion	Songa Offshore, Norway	Mid 2015	Daewoo Shipbuilding & Marine Engineering
		Drillship	1 vessel	USD 600 million	Seadrill, Norway	Second half of 2014	Samsung Heavy Industries
		Drillship	1 vessel	USD 655 million	Diamond Offshore Drilling Limited., U.S.A	4th quarter of 2014	Hyundai Heavy Industries
	Jun	Semi-submersible drilling rig	1 unit	USD 700 million	Fred Olsen Energy, Norway	March 2015	Hyundai Heavy Industries
		LNG-FPSO	1 unit	-	Petroliam Nasional Berhad, Malaysia	June 2015	Daewoo Shipbuilding & Marine Engineering
	Jul	Drillship	1 vessel	USD 645 million	Ensco plc	-	Samsung Heavy Industries
		Gas Compression Platform	1 unit	USD 420 million	(Letter of Award)	Second half of 2015	Hyundai Heavy Industries
	Aug	LNG-FSRU	8 vessels	-	Excelerate, U.S.A	Between early 2015~2017	Daewoo Shipbuilding & Marine Engineering
	Sep	Drillship	1 vessel	USD 620 million	Rowan, U.S.A	First half of 2015	Hyundai Heavy Industries
		Drillship	1 vessel	USD 623 million	-	-	Samsung Heavy Industries
	Oct	Drillship	4 vessels	USD 2.06 billion	Transocean, U.S.A	One-by-one from mid 2015	Daewoo Shipbuilding & Marine Engineering
		Drillship	1 vessel	USD 560 million	Atwood Oceanics, U.S.A	-	Daewoo Shipbuilding & Marine Engineering
		LNG-FSRU	1 vessel	USD 270 million	Hoegh LNG, Norway	First half of 2015	Hyundai Heavy Industries
	Nov	Drillship	1 vessel	USD 700 million	-	2nd half of 2015	STX Offshore & Shipbuilding
	Dec	offshore platform (Top side)	1 unit	USD 1.77 billion	Statoil, Norway	The end of 2016	Daewoo Shipbuilding & Marine Engineering
2013	Jan	Gas Production Platform (topside)	1 unit	USD 1.1 billion	Statoil, Norway	Mar 2016	Hyundai Heavy Industries
		LNG-FSRU	1 vessel	-	BW Maritime, Singapore	2015	Samsung Heavy Industries
	Mar	Floating Production Unit (FPU)	1 unit	USD 1.3 billion	Total, France	First half of 2016	Hyundai Heavy Industries
		Tension Leg Platform (TLP)	1 unit	USD 700 million	Total, France	First half of 2015	Hyundai Heavy Industries
	Apr	FPSO	1 unit	USD 1.9 billion	Chevron, U.S.A	-	Hyundai Heavy Industries
	May	Semi-Submersible Drilling Rig	1 unit	USD 750 million	Diamond Offshore, U.S.A	Nov of 2015	Hyundai Heavy Industries

	Jun	Ultra-deepwater Drillship	1 unit	USD 515 million	Ensco, United Kingdom	Third quarter of 2015	Samsung Heavy Industries
		FPSO	1 unit	USD 3.0 billion	Nigeria	Second half of 2017	Samsung Heavy Industries
		Jack-up Rig	2 units	USD 1.3 billion	Statoil, Norway	-	Samsung Heavy Industries
	Jul	Ultra-deepwater Drillship	2 units	USD 600 million	Seadrill, Norway	Second half of 2015	Samsung Heavy Industries
		Semi-Submersible Rig	1 vessel	USD 718 million	Stena, Sweden	First half of 2016	Samsung Heavy Industries
		Ultra-deepwater Drillship	1 unit	USD 570 million	Atwood Oceanics, U.S.A	The end of 2015	Daewoo Shipbuilding & Marine Engineering
	Sep	Drillship	1 unit	USD 550 million	-	Dec of 2015	Samsung Heavy Industries
		Ultra-deepwater Drillship	1 unit	USD 600 million	Ocean Rig, Greece	Dec of 2015	Samsung Heavy Industries
		Jack-up Rig	1 unit	USD 530 million	Maersk Drilling, Denmark	The middle of 2016	Daewoo Shipbuilding & Marine Engineering
	Oct	Drillship	2 vessels	USD 1.24 billion	-	Second half of 2015	Daewoo Shipbuilding & Marine Engineering
		Drillship	1 vessel	USD 520 million	Transocean, U.S.A	The middle of 2016	Daewoo Shipbuilding & Marine Engineering
		LNG-FSRU	1 unit	-	Gas Sayago (Joint venture)	Sep of 2016	Daewoo Shipbuilding & Marine Engineering
	Dec	LNG-FSRU	1 unit	-	BW Maritime, Singapore	Early 2016	Samsung Heavy Industries
		LNG-FSRU	1 unit	-	Mitsui OSK Line, Japan	The middle of 2016	Daewoo Shipbuilding & Marine Engineering
2014	Feb	LNG-FPSO	1 unit	USD 1.45 billion	Petroliam Nasional Berhad, Malaysia	2018	Samsung Heavy Industries
	Apr	Drillship	2 vessels	USD 1.29 billion	Oceania	First half of 2017	Samsung Heavy Industries
	Jul	Central Processing Platform	2 units	USD 700 million	Hess E&P Malaysia, Malaysia	The end of 2016	Hyundai Heavy Industries
		Fixed offshore platform	4 units	USD 1.94 billion	ADMA-OPCO, UAE	The end of 2019	Hyundai Heavy Industries
	Nov	Fixed Offshore Platform & Subma-rine Cable	4 units	USD 1.9 billion	ADMA-OPCO	Second half of 2019	Hyundai Heavy Industries
		Offshore Platform	1 unit	USD 700 Million	Royal Dutch Shell	-	Samsung Heavy Industries
		FPU	1 unit		-	-	
2015	Jun	Offshore Platform	2 unit	USD 1.06 billion	Statoil, Norway	The end of 2018	Samsung Heavy Industries
	Jul	FLNG	3 unit	USD 4.7 billion	Royal Dutch-Shell	-	Samsung Heavy Industries
2016	Dec	LNG-FSRU	1 unit	USD 587 million	Maran Gas Maritime, Greece	First half of 2020	Daewoo Shipbuilding & Marine Engineering
2017	Jan	FPU	1 unit	USD 1.27 billion	British Petroreum, United Kingdom	Augst of 2020	Samsung Heavy Industries
		FSRU	1 unit	USD 230 million	Höegh LNG, Norway	May of 2019	Samsung Heavy Industries
		FSRU	1 unit	USD 230 million	Höegh LNG, Norway	4th quarter of 2018	Hyundai Heavy Industries
	Feb	FSRU	1 unit	-	Turkey	-	Hyundai Heavy Industries
	Jun	FLNG	1 unit	USD 2.50 billion	ENI, Italy	-	Samsung Heavy Industries
	Aug	FSRU	1 unit	USD 230 million	Swan Energy, India	First half of 2020	Hyundai Heavy Industries
	Oct	LNG-FSRU	1 unit	KRW 250 billion	Marubeni-Sojitz-Pertamina Consortium	-	Samsung Heavy Industries

*Note : Based on the press release and public announcements of each shipyards, internal estimation of Monthly KORSHIP (estimation until Oct 15, 2017)

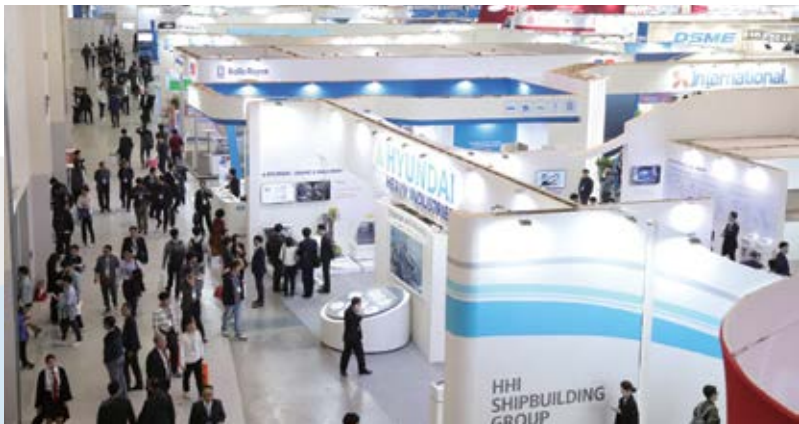
KORMARINE 2017 closed with great success

- A global event providing a window in the future of shipbuilding and offshore industry!

KORMARINE 2017, an international shipbuilding and offshore exhibition that marked its 20th anniversary this year, opened with great fanfare on October 27. This event provided windows of hopes for future shipbuilding and offshore industry despite current recession in shipbuilding industry.

Particularly, this year's event showed high rate of participation, including Korea's 3 shipbuilding heavyweights such as Hyundai Heavy Industries (HHI), Samsung Heavy Industries (SHI), and Daewoo Shipbuilding & Marine Engineering (DSME) which participated in the event for the first time. As many as 1,000 exhibitors from 45 countries participated in this year's event with a total of 2,200 booths.

The exhibitors include Korea's 3 shipbuilding heavyweights and major domestic and overseas marine equipment makers such as ABB, Alfa Laval, Panasia, MAN Diesel, Nexans Korea, Krohne, Emerson, Bosch, Jotun, Danfoss, Inmarsat, etc., which showcases the latest technologies and products.




EMERSON
CONSIDER IT SOLVED


LE-TEC Inc.


EMERSON


BOSCH
Invented for life
Rexroth

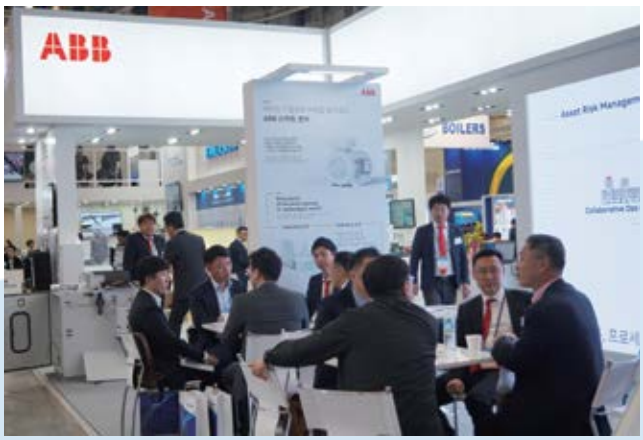
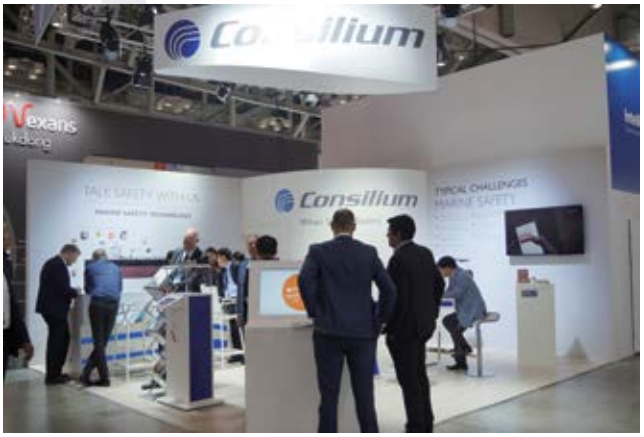


ABB
BOILERS


HYUNDAI
HEAVY INDUSTRIES


DSME


International


Consillium


TTS
TTS


FLUENTA
KROHNE
SEIKO
KROHNE
KROHNE
KROHNE
FILTREX
NEW!


HANSAE
HANSAE
HANSAE


techflow marine
HANLA
IMS


WORLDOCEAN
Honeywell
ENRAF TANK SYSTEM SA
CORROCOAT


CATERPILLAR


WAGO
MARINE


KME


BMT


evoqua


azbil


Ballast Water Management System


OK T&T


inmarsat


SURPRIS
INGLY
INGENIOUS


2017 KORMARINE
United Kingdom
4K17
survitec
COMPLETE SAFETY SOLUTIONS


HEMPEL


Kukdong


Rittal – The System.
Faster – better – everywhere.
Information


Our technology. Your success.
KSB

New Product

Next-generation Lipator & Lipatomat grease separators

ACO Marine

The ACO Lipatomat is available as a composite version (left) or manufactured from stainless steel (right).

ACO Marine has begun marketing its next-generation Lipator and Lipatomat grease separators, following the successful development of a new pneumatic valve and the standardisation of component parts. The range of treatment capacities has been increased, with the new stainless-steel Lipator and Lipatomat units capable of treating between 1 and 25 litres per second.

The result is a more economical high-end stainless-steel grease separation system capable of providing the highest level of treatment and performance which is now also available manufactured from composite materials. This combination of increased capacity range and material choice means that reliable grease separation is available for all vessel types and all budgets facilitating the treatment of galley wastewater and the protection of downstream wastewater treatment plants.

ACO Marine Managing Director Mark Beavis says the development allows the commercial shipping sector to treat galley waste fats, oils and greases more efficiently for the same cost as a traditional grease trap system and up to 50% less than existing grease separation systems.

“Based on market demand and feedback from our customers, we have modified the Lipator and Lipatomat products by bringing production completely in-house, reducing and standardising components and installing a new pneumatic valve to enhance operational performance,” said Beavis. “On installations where local working air is unavailable, a unit mounted micro-compressor is provided. These developments have allowed us to pass on to our customers the savings we have achieved in production and procurement, resulting in cost-effective grease separation solutions without impacting treatment efficiency.”

Treatment of grease is a huge problem for ship operators and usually dealt with by way of a grease trap. While these systems are reasonably effective if regularly cleaned, the reality is that congealed fat quickly accumulates, clogging up and damaging the pipework and, ultimately, the wastewater treatment plant.

ACO Marine is now actively marketing the new Lipator and Lipatomat grease separators in the commercial ship segment, particularly towards those vessels operating in environmentally-sensitive waters, such as the Arctic, Southern Ocean and Baltic Sea.

-TEL: +420-230-230-371

-http://www.acomarine.com

New antifouling coatings "Globic 9500 series"

Hempel

Hempel is launching two new premium antifouling coatings, Globic 9500M and Globic 9500S. The coatings offer customers a potential 2.5 per cent reduction in speed loss. This equates to significant fuel savings and lower CO_2 emissions improving the operational efficiency of a vessel and minimising the operator's environmental footprint.

This next generation coating series builds on Hempel's proven Globic technology to deliver superior antifouling performance for new buildings and dry-dockings, delivering an outstanding return on investment and flexibility from outfitting through the entire docking interval.

Hempel's patented Nano acrylate technology is the strength behind the Globic range and provides a fine polishing control mechanism to bring the integral biocides to the surface at a stable rate ensuring a clean hull. By combining the strongest binder and biocide package for premium performance at different trading speeds, Globic 9500M and Globic 9500S outperform other self-polishing coatings (SPC) particularly when slow steaming.

Additionally, the patented microfibres incorporated in the paint give Globic 9500M and Globic 9500S a best in class mechanical strength to avoid cracking and peeling. Globic's unique technology allows it to start working as soon as the hull meets the water for full and immediate antifouling protection, making it highly efficient even for slow steaming and long idle periods.

Globic 9500 Series at a glance:

- Lasting protection against all kinds of fouling – designed for 60+ months docking intervals
- Suitable for all vessels at all speeds
- Incorporates proven patented Nano acrylate technology
- Patented microfibres for best-in-class mechanical strength to avoid cracking and peeling
- Outperforms other SPC, particularly during slow steaming
- Excellent colour stability

Nano acrylate technology

The new coatings incorporate specially designed water-activated Nano acrylate technology that uses nano capsules to control polishing. When seawater comes into contact with the nano capsules, it penetrates the hydrophobic outer shell. The hydrophilic inner core chemically hydrolyses and then expands which breaks through the outer shell, enabling controlled polishing. Consistent self-polishing and a constantly thin leach layer ensure uniform biocide release over the entire docking interval. Unlike other premium antifouling technologies, Nano acrylate technology provides immediate antifouling protection without the need for water friction.

-TEL: +82-51-679-9300
-http://www.hempel.com

New Product

차세대 DeltaV™ PK 컨트롤러

에머슨 오토메이션 솔루션즈

DeltaV™ PK 컨트롤러 차세대 제어기는 PLC에 의존하는 모든 프로세스 산업, 특히 생활 과학, 석유 및 가스, 석유화학 등 부문에 확장 가능한 자동화 제어를 제공한다. 목적에 맞는 DeltaV PK 컨트롤러는 제조사들이 스키드 유닛(skid units)을 위해 축소하거나 더 큰 플랜트의 경우 기본적으로 DeltaV DCS에 통합되기 위해 확장하는 것을 가능하게 하는 프로세스 업계 최초 제어기라 할 수 있다.

오늘날 이들 산업은 규모가 작은 어플리케이션에서 PLC를 사용하는 경향이 있으며 이는 분리된 "자동화의 섬"을 만들어내며 플랜트 생산 향상성을 제한한다. DeltaV PK 컨트롤러는 소규모 및 대규모 어플리케이션의 진정한 교량 역할을 하는 최초 제어기이다.

에머슨의 프로덕트 매니저인 제시카 조르단(Jessica Jordan)은 "DeltaV PK 컨트롤러는 모든 규모의 조직에 맞는 비즈니스 효과적인 솔루션을 제공하여 자동화 제어 및 통합을 향상할 수 있다"며, "오늘날의 최신 스키드 자동화를 위한 강력한 독립적 제어를 제공함과 동시에 전체 플랜트 생산 제어를 위한 풀 스케일 DCS에도 쉽게 통합될 수 있다"고 덧붙였다.

DeltaV PK 컨트롤러는 에머슨의 Project Certainty(프로젝트 확실성) 이니셔티브에 추가된 최신 제품으로, 자본 프로젝트 실행의 근본적인 변화를 목표로 한다. 이 제어기는 OEM 스키드 제조사들이 현재와 동일한 방식으로 스키드를 설계하고 생산할 수 있도록 하여 자본 프로젝트를 간소화함과 동시에 PLC를 제어 시스템에 통합하는데 있어 수반되는 비용, 시간 및 위험성을 제거할 수 있다.

DeltaV PK 컨트롤러는 처음부터 연계성, 특히 IIoT를 염두에 두고 설계됐다. 확장 가능한 제어기는 내장 OPC UA 서버를 갖춘 에머슨의 첫 제어기를 포함하는 다양한 통신 프로토콜을 활용한다. 또한, 6개의 이더넷 포트를 갖추었으며 DeltaV 전자마샬링, 전통적으로 마샬링 된 I/O, wireless I/O, 통합 안전 계기 시스템 등 그 어떤 에머슨 DeltaV I/O 방식이든 관계없이 연동이 가능하다.

-TEL: +82-2-3438-4600
-http://www2.emersonprocess.com

Eco Struxure™ 산업용 소프트웨어 플랫폼

슈나이더 일렉트릭 코리아

슈나이더 일렉트릭이 통합 모듈형 소프트웨어인 'EcoStruxure™ Industrial Software Platform'을 발표했다. 이는 산업 및 인프라 시장의 가치 사슬 전반에서 운영 가능할 뿐만 아니라 비즈니스 과제를 해결할 수 있는 다양한 기능을 갖추고 있다.

'EcoStruxure Industrial Software Platform'은 엔지니어링, 계획 및 운영, 자산 성능, 제어 및 정보 관리 부문에서 까다로운 검증을 거쳐 향상된 솔루션을 제공한다. 또한 전 세계적 10만 개 이상의 사이트에 200만 개 이상의 소프트웨어 라이선스가 배포되어 20억 개 이상의 운영 파라미터에 걸쳐 10조 건 이상의 일일 트랜잭션 처리가 가능하다. 특히 복잡하면서도 중대한 산업의 운영을 지원하는 데 필요한 규모에 맞춰 운영할 수 있다.

'EcoStruxure Industrial Software Platform'은 사물인터넷(IoT) 지원의 플러그 앤 플레이 개방형 아키텍처인 슈나이더 일렉트릭의 'EcoStruxure'에 추가된 최신 제품이다. EcoStruxure는 빌딩, 데이터센터, 산업, 인프라 등 4가지 최종 시장에 대한 전력, IT, 빌딩, 기계, 공장, 그리드의 6가지 전문 분야에서 엔드 투 엔드 솔루션을 제공한다. 또한 전 세계 고객의 디지털 혁신을 이끌어 오늘날 디지털 경제에서 경쟁력을 갖출 수 있도록 지원한다.

'EcoStruxure Industrial Software Platform'은 하드웨어와 시스템의 제약을 받지 않으며 확장 가능한 모듈형 방식으로 구축할 수 있다. 따라서 기업은 시스템 및 기술에 대한 투자를 보호함과 동시에 기술 공간을 업그레이드하여 디지털 혁신으로 나아갈 수 있다. 고객은 전 세계 4,200개 이상의 시스템 통합업체 및 5,700명의 인증된 개발자를 포함해 최대 규모의 산업용 소프트웨어 에코시스템을 사용함으로써 글로벌 공급 및 소프트웨어 지원 표준이 모든 위치에서 최고 품질로 일관되게 구현된다는 확신을 가질 수 있다.

'EcoStruxure Industrial Software Platform'은 사용 가능한 모든 기능을 위해 구독, SaaS, 영구성 등 광범위한 상용 옵션과 함께 온프레미스, 클라우드 기반의 배포 유연성을 제공해준다. 따라서 위험 요소나 데이터 보안 및 성능 요구 사항에 영향을 미치지 않으면서 총소유비용을 최소화할 수 있다.

새로운 플랫폼의 풍부하고 다양한 도메인별 기능을 활용하여 엔지니어링, 운영, 자산 관리 및 인력 활용 부문에서 비즈니스 우수성을 확보할 수 있다. 산업 과제에 따라 다른 여러 플랫폼 모듈 전반에서 다양한 정보 관리, 비즈니스 프로세스 지식 및 의사 결정 지원 기능을 사용할 수 있으므로 기업은 역량을 업그레이드하고 풍부한 운영 경험을 유지하면서 차세대 인력을 개발할 수 있다.

-TEL: +82-2-1588-2630
-http://www.schneider-electric.co.kr

BMEA (Busan Marine Equipment Association)
Member List

ANSWER CO., LTD.
Head Office : Gangseo-gu Busan
Homepage Add. : www.answerclear.com
Main Products : CO2 Extinguishing Sys. External Fire Fighting Sys.
TEL : +82-51-831-3691

BANDO MARINE.
Head Office : Gangseo-gu Busan
Homepage Add. : www.bando.info
Main Products : Life Boat
TEL : +82-51-831-1950

BERM YOUNG VALVE.
Head Office : Gangseo-gu Busan
Homepage Add. : www.byvalve.com
Main Products : Quick Closing Valve, Ball Valve, Bellows, Beal Valve
TEL : +82-51-311-2511

B-I INDUSTRIAL CO., LTD.
Head Office : Gangseo-gu, Busan
Homepage Add : www.b-i.co.kr
Main Products : Fire & gas detection system, smoke, heat & flame detector.
TEL : +82-51-441-5670

BMT CO., LTD.
Head Office : Yangsan Gyeongsangnam-do
Homepage Add. : www.superlok.com/
Main Products : Fitting & Valve, Vacuum Clamp
TEL : +82-55-783-1000

BO KYOUNG IND., CO.
Head Office : Gangseo-gu Busan
Homepage Add. :
Main Products : O-ring, Sealing, Gasket
TEL : +82-51-831-4615

BOKYUNGTL CO., LTD.
Head Office : Gangseo-gu Busan
Homepage Add. :
Main Products : Rudder Body, Winch, Crane
TEL : +82-51-832-0801

BO MYUNG METAL CO., LTD.
Head Office : Saha-gu Busan
Homepage Add. :
Main Products : Copper Tube & Pipe, Cupro-Nikel Pipe, Copper Fitting
TEL : +82-51-266-4101

BOYANG HARDWARE CO., LTD.
Head Office : Kimhae Gyeongsangnam-do
Homepage Add. : www.byhd.co.kr
Main Products : Stairway Body, Ladder, Hardware
TEL : +82-55-345-1951

BUSAN INDUSTRY CO.
Head Office : Gangseo-gu Busan
Homepage Add. :
Main Products : Powder Coating
TEL : +82-51-831-4810

BUSUNG PLANT CO., LTD.
Head Office : Gangseo-gu Busan
Homepage Add. :
Main Products : Cargo Reducer Piece
TEL : +82-51-831-1784

CEPHAS PIPELINES CO., LTD.
Head Office : Gangseo-gu Busan
Homepage Add. :
Main Products : Butterfly Valve
TEL : +82-51-263-3661

CHK CO., LTD.
Head Office : Gangseo-gu Busan
Homepage Add. : www.chkj.co.kr
Main Products : Telephone Booth, Work Shop, Cable Box, Spare Box
TEL : +82-51-831-9500

CHWANG HYEOP INSTRUMENTS.
Head Office : Gangseo-gu Busan
Homepage Add. : www.chkj.co.kr
Main Products : Telephone Booth, Work Shop, Cable Box, Spare Box
TEL : +82-51-831-3607

CHANG WON ENVIRONMENT IND CO., LTD.
Head Office : Kimhae Gyeongsangnam-do
Homepage Add. : www.seaclean.kr
Main Products : Sewage Tredtment Plant
TEL : +82-55-342-5545

CMR KOREA CO., LTD.
Head Office : Kumjung-gu Busan
Homepage Add. : www.cmkkorea.com
Main Products : Temperature & Press Sensor, Alarm Monitoring Sys.
TEL : +82-51-521-2883

DAECHANG METAL CO., LTD.
Head Office : Saha-gu Busan
Homepage Add. :
Main Products : Main Bearing support, Chain Wheel, Gear Wheel
TEL : +82-51-264-0831

DAE-DONG ENTEC CO., LTD.
Head Office : Gangseo-gu Busan
Homepage Add. : www.ddentec.com/
Main Products : Air Cooler, Oil Cooler, Oil Tank, Air Tank, Oil Heater
TEL : +82-51-832-1123

DAE HAN HEAT ELECTRIC MACHINERY IND.,CO.
Head Office : Kijang-kun Busan
Homepage Add. :
Main Products : CO_2 Welder, DC Tig, Welder, AC ARC Welder
TEL : +82-51-724-6777

DAEHEUNG IND. CO., LTD.
Head Office : Gangseo-gu Busan
Homepage Add. : www.daeheungind.kr/kr/
Main Products : Forged Flanges, Nozzel & Forged Neck, Forged Items for ship
TEL : +82-51-831-6635

AQ TECK CO., LTD.
Head Office : Gangseo-gu Busan
Homepage Add. :
Main Products : Flower Meter, Viscometer, Control Valve
TEL : +82-51-831-3720

DAEHWA TECHNICAL CO., LTD.
Head Office : Kimhae Gyeongsangnam-do
Homepage Add. :
Main Products : Shot & Blast, Painting, Painting's Manufacture
TEL : +82-55-329-5705

DAEJUNG SPECIAL STEEL CO., LTD.
Head Office : Gangseo-gu Busan
Homepage Add. :
Main Products : Winch, Shaft, Gear Cluch
TEL : +82-51-831-1133

DAEKYUNG CO., LTD.
Head Office : Saha-gu Busan
Homepage Add. : www.dkhoist.com
Main Products : Chain Block, Lever Block Trelley
TEL : +82-51-264-6611

DAERIM MACHINERY CO., LTD.
Head Office : Gangseo-gu Busan
Homepage Add. : www.dae-rim.kr
Main Products : Head, Air Receiver Tank, Pressure Vessel, Reactor
TEL : +82-51-831-1456

DAESAN ENGINEERING CO., LTD.
Head Office : Gangseo-gu Busan
Homepage Add. : www.daesan-eng.com
Main Products : E/R Package unit, Pipe Group Unit
TEL : +82-51-831-0090

DAE SEONG MARINE TEC CO., LTD.
Head Office : Gangseo-gu Busan
Homepage Add. : www.ds-frp.com/
Main Products : Pipe Insulation System, FRP Weather Door
TEL : +82-51-832-2071

DAESUNG IND CO.
Head Office : Gangseo-gu Busan
Homepage Add. :
Main Products : VENT SYS, OIL TANK, Out Fitting
TEL : +82-51-831-7427

DAE WON HEAVY INDUSTRIES CO., LTD.
Head Office : Gangseo-gu Busan
Homepage Add. : www.daewonindustry.co.kr/
Main Products : Deck Machinery, Deck Equipments, OffShore
TEL : +82-51-831-5215

DAEWON METAL IND. CO., LTD.
Head Office : Gangseo-gu Busan
Homepage Add. : www.galvanizing.co.kr/
Main Products : Hot Dip Galvanizing, Pipe for Shipbuilding
TEL : +82-51-831-2541

DAEYANG ELECTRIC CO., LTD.
Head Office : Saha-gu Busan
Homepage Add. : www.daeyang.co.kr
Main Products : Precision Instrument
TEL : +82-51-200-5331

DAEYANG INSTRUMENT CO., LTD.
Head Office : Saha-gu Busan
Homepage Add. : www.daeyang.co.kr
Main Products : Precision Instrument
TEL : +82-51-200-5331

DAEYANG SP CO., LTD.
Head Office : Yangsan Gyeongsangnam-do
Homepage Add. :
Main Products : Welding machine
TEL : +82-55-388-3800

DA HEUNG ENG. CO., LTD.
Head Office : Sasang-gu Busan
Homepage Add. :
Main Products : Marine valves
TEL : +82-51-311-1882

DAOM METAL.
Head Office : Sasang-gu Busan
Homepage Add. :
Main Products : Sus plate, Flange, Pipe sleeve
TEL : +82-51-315-1347

DEAIL MACHINERY.
Head Office : Gangseo-gu Busan
Homepage Add. :
Main Products : Piston Rod, Cross headpin, Propeller Shaft
TEL : +82-51-832-1119

DECKWIN CO., LTD.
Head Office : Youngdo-gu Busan
Homepage Add. : www.deckwin.com
Main Products : Winch
TEL : +82-51-413-1193

DH-M CO., LTD.
Head Office : Seo-gu Incheon
Homepage Add. : www.dhm.co.kr
Main Products : High Pressure Blower, High Pressure Washer
TEL : +82-32-527-5782

DHP ENGINEERING CO., LTD.
Head Office : Dongnae-gu Busan
Homepage Add. : www.dhpeng.com
Main Products : Plate Type heat Exchanger, Disk & Shell type heat Exchanger
TEL : +82-51-556-4200

DINES CO., LTD.
Head Office : Gangseo-gu Busan
Homepage Add. :
Main Products : Provision Crane, Tilting Radar Post
TEL : +82-51-971-0972

DK INDUSTRIAL CO., LTD.
Head Office : Saha-gu Busan
Homepage Add. : www.dk-ind.com/
Main Products : Silencer, Fire Damper, Lashing Bridge, Rudder
TEL : +82-51-832-1436

DK TECH CORPORATION CO., LTD.
Head Office : Kimhae Gyeongsangnam-do
Homepage Add. : www.dklok.com
Main Products : Instrument TuBe Fitting, Instrument Valve
TEL : +82-55-338-0114

DNP CO., LTD.
Head Office : Gangseo-gu Busan
Homepage Add. : www.dnpco.kr
Main Products : Fire & Gas Damper, Galley Equipment, AL, Steel Furniture
TEL : +82-51-831-4551

DOLIM PRECISION.
Head Office : Gangseo-gu Busan
Homepage Add. :
Main Products : Cross Head Pin, Main Journal, Crank Shaft
TEL : +82-51-831-8861

DONG-A VALVE IND.
Head Office : Gangseo-gu Busan
Homepage Add. :
Main Products : Marine Offshore valve, Strainer
TEL : _+82-51-831-1500

DONGBANG SHIP MACHINERY CO., LTD.
Head Office : Jinhae Gyeongsangnam-do
Homepage Add. : www.dongbangsm.co.kr
Main Products : General Steel Poping, Framo & Hydro Piping, Module Unit
TEL : +82-55-545-0882

DONGHAE INTEC CO., LTD.
Head Office : Gangseo-gu Busan
Homepage Add. : www.dhintec.co.kr
Main Products : Sleeve, Scupper, Suction Bell Mouth
TEL : +82-51-831-2565

DONG HUN ENTERPRISE CO.
Head Office : Sasang-gu Busan
Homepage Add. :
Main Products : Ball Valve
TEL : +82-51-314-2610

DONGHWA ENTEC CO., LTD.
Head Office : Gangseo-gu Busan
Homepage Add. : www.dh.co.kr
Main Products : E/R Heater & Cooler, Copt, Condenser, Plate Heat Exchanger
TEL : +82-51-970-1000

DONGHWA M&E CO., LTD.
Head Office : Gangseo-gu, Busan
Homepage Add. : www.donghwame.com
Main Products : Heat Exchanger
TEL : +82-51-971-3455

DONGHWA PNEUTEC CO., LTD.
Head Office : Gangseo-gu Busan
Homepage Add. :
Main Products : Air Comfressor, Cylinder, Cylinder, Head, Piston
TEL : +82-51-974-4800

DONGIL SHIPYARD CO., LTD.
Head Office : Saha-gu Busan
Homepage Add. :www.dongilshipyard.co.kr
Main Products : Rescue Boat Davit & Winch, Assembly, Line Hauler
TEL : +82-51-200-1211

DONGKYUNG INDUSTRY CO., LTD.
Head Office : Gangseo-gu Busan
Homepage Add. : www.dki21.co.kr
Main Products : Reducer, Gear
TEL : +82-51-832-1602

DONG NAM ENGINEERING CO., LTD.
Head Office : Saha-gu Busan
Homepage Add. : www.dongnam-eng.com
Main Products : Electric Control Panel
TEL : +82-51-204-3984

DONGNAM PRECISION IND. CO., LTD.
Head Office : Gangseo-gu Busan
Homepage Add. :
Main Products : Multi Core Tube, Sus Cable Tray & Cover, LNG Line Out Fitting
TEL : +82-51-831-3500

DONG SUNG HIGHTECH.
Head Office : Gangseo-gu Busan
Homepage Add. : www.dshitech.com
Main Products : Shutter Grill, P-Chamber, Diffuser, Frie Damper, Volume Damper
TEL : +82-51-831-9561

DONGYANG G.T.S.
Head Office : Gangseo-gu Busan
Homepage Add. :
Main Products : Compresed Centellen Board, Metal Inserting Gasket
TEL : +82-51-831-6505

DONGYANG HYDTEC CO., LTD.
Head Office : Gangseo-gu Busan
Homepage Add. : www.dongyang-hyd.com
Main Products : Rudder & propeller Truck, Block lifter, Gripper Jack System
TEL : +82-51-831-6185

DONGYANG METAL CO., LTD.
Head Office : Sasang-gu Busan
Homepage Add. : www.dy-metal.co.kr
Main Products : Swing bolt a' ssy, Fittings
TEL : +82-51-814-5157

DONGYOUNG ELECTRIC CO., LTD.
Head Office : Gangseo-gu Busan
Homepage Add. : www.dyelectric.com
Main Products : Main Switchboard, Emergency Switchboard
TEL : +82-51-261-9800

DSB ENGINEERING CO., LTD.
Head Office : Youngdo-gu Busan
Homepage Add. : www.dseng.com
Main Products : Totally Enclosed, Lifeboat, Herged Qrarity Davit
TEL : +82-51-412-5937

DSE BEARING CO., LTD.
Head Office : Gangseo-gu Busan
Homepage Add. : www.dsebearing.com
Main Products : Metal Bearing
TEL : +82-51-831-2046

DSK CO., LTD.
Head Office : Youngdo-gu Busan
Homepage Add. : www.dskworld.com
Main Products : Piston Crown
TEL : +82-51-417-7800

DUYOUNG INDUSTRIAL MACHINES CO., LTD.
Head Office : Gangseo-gu Busan
Homepage Add. :
Main Products : Plate-Baffle
TEL : +82-51-831-2477

EM SYSTEC CO., LTD.
Head Office : Sasang-gu Busan
Homepage Add. : www.emsystec.com
Main Products : Marine Switch Board, Control Console
TEL : +82-51-302-8761

FRIEND CO., LTD.
Head Office : Gangseo-gu Busan
Homepage Add. : www.thefriend.co.kr
Main Products : Marine Cable Tray, Mud Box, Strainer
TEL : +82-51-831-9456

GEO MAEK SHOT&PAINT CO.,LTD.
Head Office : Saha-gu Busan
Homepage Add. :
Main Products : Deck Machinery Part, Hose Handling Crane
TEL : +82-51-264-3315

GEORIM ENGINEERING CO., LTD.
Head Office : Gangseo-gu Busan
Homepage Add. : www.kangrim.com
Main Products : Marine Indutrial Boiler, Exhaust Gas Boiler
TEL : +82-51-831-2929

GISUNG ENGINEERING CO., LTD.
Head Office : Gangseo-gu Busan
Homepage Add. :
Main Products : Air Reserovir, Heat Exchanger
TEL : +82-51-831-4475

G. M. TEC CO., LTD.
Head Office : Gangseo-gu Busan
Homepage Add. : www.igmtec.com
Main Products : Duct Equip't Seat Support
TEL : +82-51-831-5851

G.S HIGH-TECHER CO., LTD.
Head Office : Gangseo-gu Busan
Homepage Add. : www.gshightecher.koreasme.com
Main Products : Air Vent Head, Pipe Coupling
TEL : +82-51-832-0456

G&S PRECISION IND CO., LTD.
Head Office : Gangseo-gu Busan
Homepage Add. :
Main Products : Cable Tray, Vent, Hull Outffittings
TEL : +82-51-831-0849

HAE DONG METAL CO., LTD.
Head Office : Gangseo-gu Busan
Homepage Add. : www.hdanode.com
Main Products : Zinc Anode, Al Anode
TEL : +82-51-831-3751

HAE DUK RUDDER & R.STOCK CO., LTD.
Head Office : Gangseo-gu Busan
Homepage Add. : www.rudders.co.kr
Main Products : Rudder & R.Stock, Rudder Horn, Rudder Carrier
TEL : +82-51-831-0101

HAE SUNG INDUSTRIAL.
Head Office : Saha-gu Busan
Homepage Add. : www.hsjs.co.kr/
Main Products : Cable Tray, Cable Way Fitting, Cable Coaming
TEL : +82-51-264-8103

HAEWON INDUSTRIES CO.
Head Office : Gangseo-gu Busan
Homepage Add. :
Main Products : P/Crown, P/Skirt
TEL : +82-51-831-4600

HAEWON IND. CO., LTD.
Head Office : Sasang-gu Busan
Homepage Add. : www.heawon.net
Main Products : Copper, Copper-Nickel, Monel Fitting & Flanges
TEL : +82-51-312-2161

HAEYANG FAMILY CO., LTD.
Head Office : Gangseo-gu Busan
Homepage Add. :
Main Products : F.P Propeller, C.P Propeller, Propeller Shaft
TEL : +82-51-831-3550

HAEYANG METAL CO., LTD.
Head Office : Gangseo-gu Busan
Homepage Add. :
Main Products : F.P Propeller, C.P Propeller, Propeller Shaft
TEL : +82-51-831-4591

HAEYANG PROPELLER CO., LTD.
Head Office : Gangseo-gu Busan
Homepage Add. :
Main Products : Marine Propeller
TEL : +82-51-831-4599

HANCHANG TRANS CO., LTD.
Head Office : Gangseo-gu Busan
Homepage Add. : www.hctr.co.kr
Main Products : Pole Mounted Transformer, Pad Mounted Transformer
TEL : +82-51-831-3470

HANJULEVEL.
Head Office : Sasang-gu Busan
Homepage Add. : www.hanjulevel.co.kr
Main Products : Level instrument Etc, Vapour Emision Control Sys.
TEL : +82-51-303-0537

HANLA IMS CO., LTD.
Head Office : Gangseo-gu Busan
Homepage Add. : www.hanlalevel.co.kr
Main Products : Cargo Tank Monitoring Sys. Tank Remote Sounding Sys.
TEL : +82-51-601-3019

HANLA IND CO., LTD.
Head Office : Saha-gu Busan
Homepage Add. :
Main Products : Oil Filter unit, Gas Blower
TEL : +82-51-264-2201

HANMAUM KI-GONG CO., LTD.
Head Office : Gangseo-gu Busan
Homepage Add. : www.hankg.co.kr
Main Products : Air Cooler Housing, Oil Cooler Housing
TEL : +82-51-831-5211

HEARTMAN CO., LTD.
Head Office : Saha-gu Busan
Homepage Add. : www.heartman.co.kr
Main Products : Nozzle Tip, Plunger Ass'y, Fuel Injection V/V
TEL : +82-51-262-8869

H.M.E.
Head Office : Kijang-kun Busan
Homepage Add. : www.hyomyungeng.com
Main Products : Battery Charger, Light Signal Column
TEL : +82-51-709-9000

HOSEUNG ENTERPRISE CO., LTD.
Head Office : Gangseo-gu Busan
Homepage Add.: www.hosent.co.kr
Main Products: Sewage Treatment System, Plasma Bilge Separator, E/R Package Unit, Tank Package Unit, Ventilator
TEL : +82-51-831-2233

HWAJIN ENTERPRISE CO., LTD.
Head Office : Gangseo-gu Busan
Homepage Add. : www.hwa-jin.com
Main Products : Control Box, Gauge Board System
TEL : +82-512-831-9447

HWAJIN PF CO., LTD.
Head Office : Saha-gu Busan
Homepage Add. : www.hwajinpf.com
Main Products : Butt-Welding Pipe, Fittings Carbon Steel
TEL : +82-51-204-3001

HWA SHIN PRECISION CO., LTD.
Head Office : Gangseo-gu Busan
Homepage Add. :
Main Products : Life Boat Winch
TEL : +82-51-831-9839

HYOSUNG STEEL TECHNOLOGIES CO., LTD.
Head Office : Gangseo-gu Busan
Homepage Add. :
Main Products : Steel plute cutting, Hy Auto or Manual
TEL : +82-51-831-5093

HYUNDAI HYCRAULIC CO., LTD.
Head Office : Gangseo-gu Busan
Homepage Add. : www.hhmc.co.kr
Main Products : TURNING ROLLER, BLOCK LIFT
TEL : +82-51-831-8611

HYUNDAI ZINC METAL CO., LTD.
Head Office : Saha-gu Busan
Homepage Add. : www.hdz.co.kr
Main Products : Sacrificial Anode, Hot Dip Galvanizing, Ship Manufacture
TEL : +82-51-266-4788

HYUNJIN MATERIALS CO., LTD.
Head Office : Gangseo-gu Busan
Homepage Add. : www.hjmco.co.kr
Main Products : Cross Head, Connecting Rod, Piston Rod
TEL : +82-51-602-7700

ILDO MACHINE ELECT CO., LTD.
Head Office : Saha-gu Busan
Homepage Add. :
Main Products : Heavy Electric Parts
TEL : +82-51-266-6066

IL - SUNG INDUSTRY CO.
Head Office : Sasang-gu Busan
Homepage Add. :
Main Products : Silencer, Water Air Filter, Air Intet Trunk
TEL : +82-51-312-4056

IN SUNG INDUSTRY CO.
Head Office : Saha-gu Busan
Homepage Add. :
Main Products : Profile, Steel Coalming Insulation
TEL : +82-51-293-7550

JAESEUNG ENGINEERING CO., LTD.
Head Office : Gangseo-gu Busan
Homepage Add. :
Main Products : Steel Pipe Spool, Sus Pipe Spool, CuNi Pipe Spool
TEL : +82-51-831-8838

JEILSANKI CO.
Head Office : Gangseo-gu Busan
Homepage Add. :
Main Products :
TEL : +82-51-831-5398

JEONG-AM SAFETY GLASS CO., LTD.
Head Office : Gangseo-gu Busan
Homepage Add. : www.jeong-am.co.kr
Main Products : Tempered Glass, Laminated Glass
TEL : +82-51-831-6161

JEONG HWA ACCOMMODATION SYSTEM CO., LTD.
Head Office : Gangseo-gu Busan
Homepage Add. : www.jeonghwa21.com
Main Products : Wooden Furniture
TEL : +82-51-974-8000

JEONG WOO COUPLING CO., LTD.
Head Office : Kimhae Gyeongsangnam-do
Homepage Add. : www.jwcjoint.co.kr
Main Products : Pipe Coupling, Pipe Repair Clamp
TEL : +82-55-339-7666

JIN GU ENGINEERING.
Head Office : Kimhae Gyeongsangnam-do
Homepage Add. :
Main Products : Rudder Stock, Stern Tube, Stern Roller, Winch
TEL : +82-55-343-3414

JIN IL BEND CO., LTD.
Head Office : Gangseo-gu Busan
Homepage Add. :
Main Products :
TEL : +82-51-832-1919

JINKWANG ELECTRIC CO., LTD.
Head Office : Gangseo-gu Busan
Homepage Add. :
Main Products : Pull Card Switch, Belt Sway Switch, Belt Speed Switch
TEL : +82-51-831-2571

JINYOUNG METAL CO., LTD.
Head Office : Sasang-gu Busan
Homepage Add. : www.jymct.co.kr
Main Products : Multi Core Tube, Welded Stainless, Steel Tube
TEL : +82-51-313-4001

JMC HYDRAULICS.
Head Office : Saha-gu Busan
Homepage Add. :
Main Products : Hydraulic Motor For Marine, Hydraulic Control Valve
TEL : +82-51-204-4046

JNC HI-TECHNOLOGIES.
Head Office : Gangseo-gu Busan
Homepage Add. : www.jnchitec.com
Main Products : Junction Box, Elect panel bard, Tel Booth
TEL : +82-51-974-9500

JOKWANG I.L.I CO., LTD.
Head Office : Gangseo-gu Busan
Homepage Add. :
Main Products :
TEL : +82-51-602-0200

JONGHAP POLESTAR ENGINEERING CO., LTD.
Head Office : Youngdo-gu Busan
Homepage Add. :
Main Products : Diesel Engine Piston, Cylinder, Valve
TEL : +82-51-403-5514

JUNG GONG IND. CO., LTD.
Head Office : Saha-gu Busan
Homepage Add. : www.jung-gong.com
Main Products : Ordinary Window Side, Scuttle, Heated Window
TEL : +82-51-261-2911

JUNG - WOO MACHINERY CO., LTD.
Head Office : Gangseo-gu Busan
Homepage Add. :
Main Products : Carrier Housing, Split Bearing,Stock, Up.Lower Sleeve
TEL : +82-51-831-5394

KANG BACK INDUSTRY CO., LTD.
Head Office : Gangseo-gu Busan
Homepage Add. :
Main Products : Electric Control Box, Valve & Similar , Equipment
TEL : +82-51-831-9025

KANGIL CO., LTD.
Head Office : Gangseo-gu Busan
Homepage Add. :
Main Products : Pressure Vessel, Deaerator, Heat Exchanger
TEL : +82-51-972-5672

KANGRIM HEAVY INDUSTRIES CO., LTD.
Head Office : Changwon Gyeongsangnam-do
Homepage Add. : www.kangrim.com/
Main Products : Marine Indutrial Boiler, Exhaust Gas Boiler
TEL : +82-55-269-7701

K.C. LTD.
Head Office : Gangseo-gu Busan
Homepage Add. : www.iccp-mgps.com
Main Products : I.C.C.P. System, M.G.P.S, Shaft Earthing Device
TEL : +82-51-831-7720

KEO HUNG MACHINERY.
Head Office : Gangseo-gu Busan
Homepage Add. :
Main Products : Deck Crane, Provision Crane, Hose Handling Crane
TEL : +82-51-831-6296

KEYSUNG METAL CO., LTD.
Head Office : Gangseo-gu Busan
Homepage Add. : www.keysungmetal.com
Main Products : Valve(Cryogenic, Ball), Strainer
TEL : +82-51-831-3391

KOC ELECTRIC CO., LTD.
Head Office : Gangseo-gu Busan
Homepage Add. :
Main Products : Cast Resin Transformer, Dry Resin Transformer
TEL : +82-51-832-0550

KOREA HYDRAULIC CO.
Head Office : Gangseo-gu Busan
Homepage Add. : www.enpos21.com
Main Products : Electtric Motor Pump, Hand Pump, Single/ Double Acting Ram
TEL : +82-51-832-1100

KOREA PHE CO., LTD.
Head Office : Gangseo-gu Busan
Homepage Add. : www.kphe.co.kr
Main Products : Plate Heat Exchanger, Tank Cleaning Heater
TEL : +82-51-261-2664

KOREA STEEL SHAPES CO., LTD.
Head Office : Sasang-gu Busan
Homepage Add. : www.ekosco.com
Main Products : Flat Bars, Equal Angles, Unequal Angles
TEL : +82-51-323-2611

KOREA TRADING & INDUSTRIES CO., LTD.
Head Office : Saha-gu Busan
Homepage Add. : www.kticopper.co.kr
Main Products : Copper alloy coil, Plate
TEL : +82-51-293-4423

KORINOX CO., LTD.
Head Office : Gangseo-gu Busan
Homepage Add. : www.korinox21.com
Main Products : Cold Mill Stainless, Steel Coil
TEL : +82-51-832-0031

KORVAL CO., LTD.
Head Office : Saha-gu Busan
Homepage Add. : www.korval.co.kr
Main Products : Crank Case Relief Valve, Main Starting Valve, Rotary Valve
TEL : +82-51-790-9700

KSP CO., LTD.
Head Office : Gangseo-gu Busan
Homepage Add. :
Main Products : Ship Engine Valve Spindle, Flange, Ring Gear
TEL : +82-51-831-6274

KSV
Head Office : Youngdo-gu Busan
Homepage Add. : www.ksv-valve.co.kr
Main Products : Valve Spindle, Seat-Ring for marine Engine
TEL : +82-51-415-4466

KTE CO., LTD.
Head Office : Gangseo-gu Busan
Homepage Add. : www.kte.co.kr
Main Products : Electrical Equipment (Switchboard & Console)
TEL : +82-51-265-0255

KUKDONG ELECOM CO., LTD.
Head Office : Saha-gu Busan
Homepage Add. : www.kukdongelecom.com
Main Products : Naviagtion/Signal LT, EX-Plosion Proof LT, Fluorescent LT
TEL : +82-51-266-0050

KUKDONG INDUSTRIAL ENGINEERING.
Head Office : Sasang-gu Busan
Homepage Add. : www.kdie.co.kr
Main Products : Exhaust Gas Pipe With Insulation, Fuel Injection Pipe and Bloc
TEL : +82-51-303-6900

KUKJE METAL CO., LTD.
Head Office : Gangseo-gu Busan
Homepage Add. : www.kjmetal.co.kr
Main Products : Manhole Cover, Portable Tank, EXH. Gas Pipe
TEL : +82-51-831-1541

KUM HAW PRECISION CO.
Head Office : Gangseo-gu Busan
Homepage Add. :
Main Products : Coupling Flange, Bellows Flange
TEL : +82-51-831-5685

KUMKANG ENGINEERING.
Head Office : Gangseo-gu Busan
Homepage Add. :
Main Products : Hand Rail, Storm Rail, Platform, Inc. Ladder
TEL : +82-51-831-0091

KUMKANG PRECISION.
Head Office : Saha-gu Busan
Homepage Add. : www.kkmarine.co.kr
Main Products : Engine Parts, (Air Reservoir) & Valve
TEL : +82-51-262-4893

KWANGIL CORP.,
Head Office : Sasang-gu Busan
Homepage Add. : www.k-i.co.kr
Main Products : Stainless Steel, HR Coil
TEL : +82-51-324-0006

KWANG JIN E.N.G CO., LTD.
Head Office : Gangseo-gu Busan
Homepage Add. :
Main Products : Pipe Piece, Pipe Spool
TEL : +82-51-831-1435

KWANG JIN IND. CO., LTD.
Head Office : Gangseo-gu Busan
Homepage Add. :
Main Products : Part of Heat Exchanger
TEL : +82-51-831-4131

KWANG JIN TECH.
Head Office : Gangseo-gu Busan
Homepage Add. :
Main Products : Non Asbestos, Teflon, Rubber
TEL : +82-51-973-5566

KWANG LIM MARINE TECH. CO.,LTD.
Head Office : Sasang-gu Busan
Homepage Add. :
Main Products : Window Box, (STEEL, AL, SUS) Vent Hole
TEL : +82-51-313-0055

KWANG SAN CO., LTD.
Head Office : Gangseo-gu Busan
Homepage Add. : www.kwangsan.com
Main Products : Heating Coil unit, Expansion joint
TEL : +82-51-974-6301

KWANGWOON CO.,LTD.
Head Office : Youngdo-gu Busan
Homepage Add. : www.kwang-woon.com
Main Products : Square Window, Side Scuttle, Door, Hatch, Window Wiper
TEL : +82-51-414-9494

KYEONG SIN FIBER CO., LTD.
Head Office : Gangseo-gu Busan
Homepage Add. : www.ksfiber.co.kr
Main Products : Rudder Bearing Bush, Insulation
TEL : +82-51-831-0268

KYOUNGWON BENDING CO.
Head Office : Kimhae Gyeongsangnam-do
Homepage Add. : www.bending4u.com
Main Products : Hwase Pipe, Chain, Locker
TEL : +82-55-313-1277

KYUNGIL METAL CO., LTD.
Head Office : Gangseo-gu Busan
Homepage Add. :
Main Products : Marine Equipment Plating, Head Rest Pipe Plating
TEL : +82-51-831-1677

KYUNGSUNG INDUSTRY CO., LTD.
Head Office : Gangseo-gu Busan
Homepage Add. : www.e-clamp.com
Main Products : Svs Corner & Anchor, Strip, Clamp
TEL : +82-51-831-4960

LHE CO., LTD.
Head Office : Kimhae Gyeongsangnam-do
Homepage Add. : www.lhe.co.kr
Main Products : Heat Exchanger
TEL : +82-55-340-0624

MANZU INDUSTRY. CO., LTD.
Head Office : Gangseo-gu Busan
Homepage Add. :
Main Products : Phosphate Coat, Pipe & Structure Painting, Special Painting
TEL : +82-51-832-0944

MARINE RADIO CO., LTD.
Head Office : Youngdo-gu Busan
Homepage Add. : www.mrckorea.co.kr
Main Products : Public Addressor Sys, Common Aerial Sys.
TEL : +82-51-414-7891

MARINE TECHNICAL ENGINEERING CO., LTD.
Head Office : Sasang-gu Busan
Homepage Add. :
Main Products : Oily Water Seperator, Bilge Alarm, Air Dryer
TEL : +82-51-831-1118

MARSEN CO., LTD.
Head Office : Gangseo-gu Busan
Homepage Add. : www.marsen.co.kr
Main Products : Cargo Tank Monitoring System, Tank High/ Overfill Alarm System
TEL : +82-51-831-2108

MAX TECH.
Head Office : Kimhae Gyeongsangnam-do
Homepage Add. : www.maxtech21c.com
Main Products : Engine, Shock Absorper, Gasket
TEL : +82-55-327-9652

MCM CO., LTD.
Head Office : Gangseo-gu Busan
Homepage Add. : www.mcm21.co.kr
Main Products : Valve, Junction Box, Switch Cover
TEL : +82-51-832-0505

MI JIN PRECISION.
Head Office : Sasang-gu Busan
Homepage Add. :
Main Products : Valve, Tube, Vend, Pipe for ship
TEL : +82-51-315-3143

MIJOO INDUSTRY CO., LTD.
Head Office : Gangseo-gu Busan
Homepage Add. :
Main Products :
TEL : +82-51-831-1588

MIRAE ENGINEERING CO., LTD.
Head Office : Gangseo-gu Busan
Homepage Add. : www.miraeship.co.kr
Main Products : Hull Block, Steel Outfitting, Pipe Spool/Unit
TEL : +82-51-790-5800

MJ TSR CO., LTD.
Head Office : Gangseo-gu Busan
Homepage Add. : www.mjtsr.com
Main Products : Rubber Sheets & Hats, All Types of Parts for Shipbuilding & Industries
TEL : +82-51-832-0002

MODERN INTECH CO., LTD.
Head Office : Sasang-gu Busan
Homepage Add. :
Main Products : Curtain, Carpet, Upholstery, Mattress for Marine
TEL : +82-51-325-0260

MT.H CONTROL VALVES CO., LTD.
Head Office : Gangseo-gu Busan
Homepage Add. :
Main Products :
TEL : 82-51-974-8831

MYTEC CO., LTD.
Head Office : Gangseo-gu Busan
Homepage Add. : www.imytec.com
Main Products : Heat Exchanger, Pressure Vassel
TEL : +82-51-831-7474

NAMSUNG SHIPBUILDING CO., LTD.
Head Office : Saha-gu Busan
Homepage Add. :
Main Products : Rescue Boat Davit & Winch, Assembly, Line Hauler
TEL : +82-51-200-1277

NAMYANG METAL.
Head Office : Gangseo-gu Busan
Homepage Add. :
Main Products : Stair Way Body, Bulk Head Hnlon, Galley Hood
TEL : +82-51-832-1721

NARA CORPORATION CO., LTD.
Head Office : Saha-gu Busan
Homepage Add. :
Main Products :
TEL : +82-51-790-7505

NAVUTEC.
Head Office : Kijang-kun Busan
Homepage Add. : www.navutec.com
Main Products : Fire fighting & Safety, equipment for marine & Offshore
TEL : +82-51-728-5055

NEW-OHSEUNG CO., LTD.
Head Office : Saha-gu Busan
Homepage Add. :
Main Products : Manifold, Spool piece, Chain compressor
TEL : +82-51-266-5724

NK CO., LTD.
Head Office : Saha-gu Busan
Homepage Add. :
Main Products : Ballast Water Treatment System, Co2 System
TEL : +82-51-204-2211

NOKSAN FLANGE CO., LTD.
Head Office : Gangseo-gu Busan
Homepage Add. :
Main Products : Flange for ship
TEL : +82-51-831-7956

OBOK ELECTRIC CO., LTD.
Head Office : Gangseo-gu Busan
Homepage Add. :
Main Products : Transformer
TEL : +82-51-832-1751

OK KWANG ENG CO., LTD.
Head Office : Gangseo-gu Busan
Homepage Add. : www.okv.co.kr
Main Products : Marine valves, Strainers
TEL : +82-51-326-7741

OK KWANG METAL CO., LTD.
Head Office : Gangseo-gu Busan
Homepage Add. : www.okkwang.com
Main Products : Std Flange, Tube Sheet, Forging Material
TEL : +82-51-831-9885

ORIENTAL PRECISION & ENGINEERING CO., LTD.
Head Office : Gangseo-gu Busan
Homepage Add. : www.opco.co.kr
Main Products : Deck house, Engine room Casing, Life Boat
TEL : +82-51-202-0101

ORIENTAL PRECISION MACHINERY CO., LTD.
Head Office : Gangseo-gu Busan
Homepage Add. : www.opco.co.kr
Main Products : Crane Component
TEL : +82-51-831-0202

O.S.C.G CO., LTD.
Head Office : Sasang-gu Busan
Homepage Add. : www.oscg.net
Main Products : Cable grand, Junction box
TEL : +82-51-305-3910

PACO HITEC CO., LTD.
Head Office : Saha-gu Busan
Homepage Add. : www.pacohitec.com
Main Products : Hydraulic hose, Fitting
TEL : +82-51-266-6994

PAL MI METAL IND CO., LTD.
Head Office : Jinhae Gyeongsangnam-do
Homepage Add. :
Main Products : Valve, Yoke, Fork, Knuckle, Carrier
TEL : +82-55-552-3840

PANASIA CO., LTD.
Head Office : Gangseo-gu Busan
Homepage Add. : www.worldpanasia.com
Main Products : Hi-level Alarm Sys. Tank level Gauge
TEL : +82-51-831-1010

PI PLUS CO., LTD.
Head Office : Gangseo-gu Busan
Homepage Add. : www.pharmaidsolutions.com
Main Products : Rudder stock, Pintle, Intermediate Shaft
TEL : +82-51-831-9338

POONG JIN METAL CO., LTD.
Head Office : Gangseo-gu Busan
Homepage Add. :
Main Products : Emergency Shut-Off Valve, Veneral Bronze Casting Valve
TEL : +82-51-831-8510

PSM CO., LTD.
Head Office : Gangseo-gu Busan
Homepage Add. : www.psminc.co.kr
Main Products : Ring Flange, Shaft, Nozzle
TEL : +82-51-970-3000

SAEJIN INTECH CO., LTD.
Head Office : Kimhae Gyeongsangnam-do
Homepage Add. : www.saejinintech.com
Main Products : Emergency Towing, Arrangement, Universal Swivel Fairlead
TEL : +82-55-328-1458

SAMBOO METAL CO,, LTD.
Head Office : Gangseo-gu Busan
Homepage Add. : www.samboometal.com
Main Products : Wheel, Shaft, Hyd-Net, Hyd Coupling Bolt, Flange
TEL : +82-51-831-1478

SAMGONG CO., LTD.
Head Office : Gangseo-gu Busan
Homepage Add. : www.sam-gong.co.kr
Main Products : Oil Purifiers, Ship' Accommodation, Ladders
TEL : +82-51-200-3040

SAMJOO ENG. CO., LTD.
Head Office : Saha-gu Busan
Homepage Add. : www.sam-joo.co.kr
Main Products : Catering Furniture, Galley Hood, Laundry Equipment
TEL : +82-51-264-6677

SAMJUNG MACHINERY.
Head Office : Gangseo-gu Busan
Homepage Add. :
Main Products : Piston Rod, Cross Head, Inter Shaft
TEL : +82-51-832-0190

SAM KWANG HI-TEC CO., LTD.
Head Office : Gangseo-gu Busan
Homepage Add. :
Main Products : Rectangle Windows
TEL : +82-51-832-0177

SAMSUNG NONFERROUS METAL CO., LTD.
Head Office : Kimhae Gyeongsangnam-do
Homepage Add. : www.metalsamsung.co.kr
Main Products : Bushing, Liner, Sleeve, Pintle Bush
TEL : +82-55-329-1067

SAMYANG METAL IND. CO., LTD.
Head Office : Saha-gu Busan
Homepage Add. : www.cuniship.com
Main Products : W-NT 90/10 Flange, Elbow, Tee
TEL : +82-51-266-6655

SAMYOUNG FITTING.
Head Office : Gangseo-gu Busan
Homepage Add. :
Main Products : Elbow, Tee, Coupling
TEL : +82-51-832-0211

SDK CO., LTD.
Head Office : Gangseo-gu Busan
Homepage Add. :
Main Products : Winch, Hatch
TEL : +82-51-832-1882

SEAPLUS CO., LTD.
Head Office : Gangseo-gu Busan
Homepage Add. : www.sea-plus.co.kr
Main Products : Low Pressure CO2, Fire Extinguishing Sys
TEL : +82-51-831-0119

SEBO METAL CO., LTD.
Head Office : Gangseo-gu Busan
Homepage Add. : www.sebometal.co.kr
Main Products : Pump Tower for LNG, Vent Mast
TEL : +82-51-970-0200

SEBO TECH CO., LTD.
Head Office : Gangseo-gu Busan
Homepage Add. :
Main Products : Windwall, Heat Shield, Manual Hatch
TEL : +82-51-831-4171

SEIL SERES CO., LTD.
Head Office : Gangseo-gu Busan
Homepage Add. : www.seilseres.com
Main Products : VRC system, ODME
TEL : +82-51-831-1858

SEJIN BOLT CO., LTD.
Head Office : Gangseo-gu Busan
Homepage Add. :
Main Products : Bolt, Nut & Be, Double Nut, Chard Nut, Hinge Bog
TEL : +82-51-831-9832

SEUNG JIN E.N.G.
Head Office : Gangseo-gu Busan
Homepage Add. :
Main Products : Pipe Spool (Steel)
TEL : +82-51-831-9050

SEUN STEEL CO., LTD.
Head Office : Jin-gu Busan
Homepage Add. : www.seunsteel.co.kr
Main Products : CR, HGL, CGL, EGL
TEL : +82-51-639-3200

SEWOONG PRECISION MACHINERY CO., LTD.
Head Office : Gangseo-gu Busan
Homepage Add. :
Main Products :
TEL : +82-51-831-0595

SEYANG HIGH-TECH
Head Office : Gangseo-gu Busan
Homepage Add. :
Main Products : Water & Oil Strainer, Condensate Chlorination Tank
TEL : +82-51-831-9125

SHILLA E&T CO., LTD.
Head Office : Gangseo-gu Busan
Homepage Add. :
Main Products : Spot Cooler, Heat Exchanger, Pressure Yeses
TEL : +82-51-831-7705

SHINDONG DIGITECH CO., LTD.
Head Office : Dong-gu Busan
Homepage Add. : www.shindong.com
Main Products : Navigation Communication, Satellite Communication
TEL : +82-51-461-5000

SHINHWA INTERIOR & TECHNOLOGY CO., LTD.
Head Office : Saha-gu Busan
Homepage Add. :
Main Products : Marine Furniture
TEL : +82-51-441-1294

SHINKWANG ACE ELECTRIC CO., LTD.
Head Office : Kimhae Gyeongsangnam-do
Homepage Add. : www.skace.com
Main Products : Cable Tray, Accessories
TEL : +82-55-332-3315

SHINMYUNG INDUSTRIAL CO., LTD.
Head Office : Gangseo-gu Busan

Homepage Add. :
Main Products : Cable Tray Joint, Hanger
TEL : +82-51-831-5061

SHIN SHIN HEAVY INDUSTRIES CO., LTD.
Head Office : Gangseo-gu Busan
Homepage Add. :
Main Products : Deck Machinery, Hydraulic system, Serface Treatment
TEL : +82-51-832-0734

SHIN SHIN MACHINERY CO., LTD.
Head Office : Kijang-kun Busan
Homepage Add. : www.sspump.com
Main Products : Centrifugal Pumps, Gear Pumps, Screw Pumps
TEL : +82-51-727-5300

SHINWOO METAL CO., LTD.
Head Office : Gangseo-gu Busan
Homepage Add. : www.shinwoometal.net
Main Products : Flange, Forging
TEL : +82-51-831-2830

SHIN YOUNG AIR CLUTCH.
Head Office : Gangseo-gu Busan
Homepage Add. : www.airclutch.co.kr
Main Products : SY-CB Type, SY-VC Type, SY-E Type
TEL : +82-51-831-7072

SILLA METAL CO., LTD.
Head Office : Gangseo-gu Busan
Homepage Add. : www.sillametal.com
Main Products : PROPELLER(F.P.P), C.PPROPELLER Blade & Hub
TEL : +82-51-831-5991

SIN HUENG FLANGE CO., LTD.
Head Office : Gangseo-gu Busan
Homepage Add. :
Main Products : Flange for ship
TEL : +82-51-831-6167

SINWEOL GRATING CO., LTD.
Head Office : Sasang-gu Busan
Homepage Add. : www.steelgrating.net
Main Products : Steel Grating for Ship
TEL : +82-51-323-7000

SMS CO., LTD.
head office : Saha Gu Busan
homepage add : www.sms-marinesystem.com
main products : hatch-pontoon type, folding type, side rolling type, etc. lashing equipment-2/3tier
TEL : +82 51-290-1000

SM POWER TEC CO., LTD.
Head Office : Gangseo-gu Busan
Homepage Add. : www.smpt.co.kr
Main Products : Vacuum Pump for Shipping Bldc, AC,DC Motor & Generator
TEL : +82-51-973-0267

SNP CO., LTD.
Head Office : Saha-gu Busan
Homepage Add. :
Main Products : Galley Equipment, Cold Chamber, Catering Furniture
TEL : +82-51-261-7711

STACO CO., LTD.
Head Office : Gangseo-gu Busan
Homepage Add. : www.staco.co.kr
Main Products : Wall Panel, Celing Panel, Unit Toilet, Marin Door
TEL : +82-51-831-7000

STA-JH CO., LTD.
Head Office : Gangseo-gu Busan
Homepage Add. :
Main Products : Welding Fittings (Butt Welding)
TEL : +82-51-831-1274

STASB CO., LTD.
Head Office : Jinhae Gyeongsangnam-do
Homepage Add. :
Main Products : Marine Furniture, Door
TEL : +82-55-544-8070

STAUFF KOREA LTD.
Head Office : Saha-gu Busan
Homepage Add. : www.stauff.co.kr
Main Products : Hyd' System & Engineering, Hyd' Clamp & Test
TEL : +82-51-266-6666

STBEND CO., LTD.
Head Office : Gangseo-gu Busan
Homepage Add. : www.stbend.co.kr
Main Products : SUS Pipe Fitting, SUS Bend
TEL : +82-51-831-5131

STEEL KOREA CO., LTD.
Head Office : Jinhae Gyeongsangnam-do
Homepage Add. :
Main Products :
TEL : +82-55-541-2212

SUHHEUNG ENGINEERING CO., LTD.
Head Office : Gangseo-gu Busan
Homepage Add. : www.shge.co.kr
Main Products : Steel Grating
TEL : +82-51-831-1811

SUNBO IND CO., LTD.
Head Office : Saha-gu Busan
Homepage Add. : www.sunboind.co.kr
Main Products : Tank Top Unit, Engine Room unit, Sater Strainer Silenser
TEL : +82-51-261-3454

SUNG CHANG CO., LTD.
Head Office : Gangseo-gu Busan
Homepage Add. :
Main Products : Non-Asbestos Gasket, Spiral Wound Gasket, P.T.F.E Gasket
TEL : +82-51-316-6300

SEOUNG HYUP MACHINERY.
Head Office : Sasang-gu Busan
Homepage Add. :
Main Products : White Metal, Piston Lo
TEL : +82-51-303-4112

SUNG IL CO., LTD.(SIM)
Head Office : Gangseo-gu Busan
Homepage Add. : www.sungilsim.com
Main Products : Pipe Spool Pre-Fabrication, Induction Pipe Bending
TEL : 82-51-831-8800

SUNG KWANG M/C.
Head Office : Gangseo-gu Busan
Homepage Add. :
Main Products : Oil Press, Pipe Vending, Pipe Fitting Unit
TEL : +82-51-831-0620

SUNGWON ELECTRIC CO.
Head Office : Gangseo-gu Busan
Homepage Add. :
Main Products : Cable Tray, Starter, Panel, Cable Way
TEL : +82-51-831-9230

SUNG WON ENTERPRISE. CO., LTD.
Head Office : Gangseo-gu Busan
Homepage Add. : www.sungwonent.co.kr
Main Products : V-Flow Swing Check, Valves, Manifold Unit
TEL : +82-51-831-2140

SUNIL INSTRUMENT CO., LTD.
Head Office : Gangseo-gu Busan
Homepage Add. : www.suniltech.co.kr
Main Products : Tank Level System, Viscosity System
TEL : +82-51-831-1994

SUN KWANG P.S.P INC. CO., LTD.
Head Office : Gangseo-gu Busan
Homepage Add. :
Main Products : Cargo Line, Ballasst Line, Engine Room, I.G Line
TEL : +82-51-831-3777

S&W CO., LTD.
Head Office : Saha-gu Busan
Homepage Add. : www.snwcorp.com
Main Products : Com Shaft, Valve, Seat, Piston Pin, Bolt, Nut
TEL : +82-51-205-7411

TAE HWA INDUSTRY CO.,LTD (THI)
Head Office : Seocho-gu Seoul
Homepage Add. : www.thi.co.kr
Main Products : Reciprocating & Screw, Compressor Unit, Brine/ Water Chiller Unit
TEL : +82-2-598-1126

TAEHWA KALPA SEAL.
Head Office : Gangseo-gu Busan
Homepage Add. : www.taehwa1.com
Main Products : TH3000, TH3000W
TEL : +82-51-831-9944

TAE KWANG INDUSTRIES.
Head Office : Gangseo-gu Busan
Homepage Add. : www.tkic.co.kr
Main Products : Boiler, Oil Cooler / Heater, Shell & Tube Heat, Exchanger
TEL : +82-51-831-1801

TAESHIN G & W CO., LTD.
Head Office : Gangseo-gu Busan
Homepage Add. : www.taeshin.co.kr
Main Products : Co2 / Mag, Mig Arc Welding, Machine, Air Gouging
TEL : +82-51-831-1100

TAESUNG MACHINERY CO., LTD.
Head Office : Gangseo-gu Busan
Homepage Add. : www.taesungmc.co.kr
Main Products : Manufacture of Structures, for Shipbuilding(LNG,LPG) and plant
TEL : +82-51-971-4006

TAEWON CO., LTD.
Head Office : Gangseo-gu Busan
Homepage Add. : www.twubc.kr
Main Products : Flange, Strainer, Pressure
TEL : +82-51-831-0310

TAEWOONG CO., LTD.
Head Office : Gangseo-gu Busan
Homepage Add. : www.taewoong.com
Main Products : Piston Rod/ Crown/ Head, Cross Head Pin
TEL : +82-51-329-5000

TAEWOONG TECH CO., LTD.
Head Office : Gangseo-gu Busan
Homepage Add. :
Main Products : Main Shaft, Connecting Rod, Inter Shaft, Propeller Shaft
TEL : +82-51-831-6685

TANKTECH CO., LTD.
Head Office : Gangseo-gu Busan
Homepage Add. : www.tanktech.co.kr
Main Products : High velocity valve
TEL : +82-51-979-1600

TK CORPORATION CO., LTD.
Head Office : Gangseo-gu Busan
Homepage Add. : www.tkbend.co.kr
Main Products : Fittings (Elbow, Tee, Reducer, Cap)
TEL : +82-51-970-6600

TMC CO., LTD.
Head Office : Kimhae Gyeongsangnam-do
Homepage Add. : www.besttmc.com
Main Products : Membrane Sheets, Heavy Steel Corner, Anchor Strip
TEL : +82-55-340-3000

TYCO MARINE SERVICES KOREA CO., LTD.
Head Office : Sasang-gu Busan
Homepage Add. : www.dbefire.com
Main Products : Fire Fighting System & Equipment
TEL : +82-51-633-9100

U-YOUNG PRECISION IND. CO., LTD.
Head Office : Kimhae Gyeongsangnam-do
Homepage Add. : u-nex.com/
Main Products : Elec/Hyd. Windless, Elec/Hyd, Winch, Steering Gear
TEL : +82-55-326-9691

U-YOUNG & TECH.
Head Office : Kimhae Gyeongsangnam-do
Homepage Add. : u-nex.com/
Main Products : Elec/Hyd. Windless, Elec/Hyd, Winch, Steering Gear
TEL : +82-55-326-9691

WON KWANG VALVE CO., LTD.
Head Office : Gangseo-gu Busan
Homepage Add. : www.wonkwangvalve.com
Main Products : Marine Globe Valve, Marine Angle Valve, Marine Gate Valve
TEL : +82-51-831-9932

WOONG CHEON OUTFITTING CO., LTD.
Head Office : Jinhae Gyeongsangnam-do
Homepage Add. :
Main Products : Ship Component Parts, Painting, Deck Machinery
TEL : +82-55-545-2432

WOOSUNG FLOWTEC CO.
Head Office : Gangseo-gu Busan
Homepage Add. :
Main Products : Simplex Oil Strainer, Can Water Filter
TEL : +82-51-831-1531

WOOYANG B&P IND CO., LTD.
Head Office : Gangseo-gu Busan
Homepage Add. : www.wooyangshot.com
Main Products : Deck Outside Monting Item, Engine Room Mounting Item
TEL : +82-51-831-5000

Y.C.P CO., LTD.
Head Office : Saha-gu Busan
Homepage Add. :
Main Products : Carbon Steel Precision, Tybe for Hydraulic Line Service
TEL : +82-51-264-9300

YESUNG IND. CO., LTD.
Head Office : Gangseo-gu Busan
Homepage Add. :
Main Products : Rudder Carrier Housing, Complete Stern Tube, Rudder Horn
TEL : +82-51-831-5246

YOOWON INDUSTRIES CO., LTD.
Head Office : Saha-gu Busan
Homepage Add. : www.yoowonind.com
Main Products : Steering Gear, Deck Machinery, Auto Filter
TEL : +82-51-205-8541

YOOWON M-TECH CO., LTD.
Head Office : Saha-gu Busan
Homepage Add. : www.yoowonmtech.com
Main Products : Steering Gear, Windlass, Mooring winch
TEL : +82-51-265-1746

YOUNGIL CNC.
Head Office : Gangseo-gu Busan
Homepage Add. :
Main Products :
TEL : +82-51-831-9547

YOUNG - IN ELECTRIC INDUSTRIES CO., LTD.
Head Office : Gangseo-gu Busan
Homepage Add. : www.younginele.com
Main Products : Electric Auto Control Panel, Welding Panel
TEL : +82-51-831-7910

YOUNG NAM IND.
Head Office : Saha-gu Busan
Homepage Add. :
Main Products : Wire lope drum, BASE PLATE ASS'Y
TEL : +82-51-264-7983

YOUNGSHIN BEND CO., LTD.
Head Office : Gangseo-gu Busan
Homepage Add. :
Main Products : Welding Fittings (Butt Welding)
TEL : +82-51-831-0316

YOUNGSUNG AIR SYSTEM.
Head Office : Gangseo-gu Busan
Homepage Add. : www.ys-airsystem.co.kr
Main Products : Heat exchanger, Plant
TEL : +82-51-832-0510

YOUNHAP FASTENERS CO., LTD.
Head Office : Kimhae Gyeongsangnam-do
Homepage Add. : www.younhap.co.kr
Main Products : Carbon Steel Precision, Tybe for Hydraulic Line Service
TEL : +82-51-264-9300

YOUSUNG GALVANIZING CO., LTD.
Head Office : Gangseo-gu Busan
Homepage Add. : www.iyousung.co.kr
Main Products : Hot Dip Galvanizing of Marine.
TEL : +82-51-831-5482

YUJINCOMETAL CO., LTD.
Head Office : Gangseo-gu Busan
Homepage Add. : www.yujincometal.com
Main Products : Bolt, Nut, Screw, Anchor, Washer
TEL : +82-51-314-0757

YU KYUNG CO., LTD.
Head Office : Gangseo-gu Busan
Homepage Add. :
Main Products : Pipe Spool, Portable Tank Unit, Heating Coil Unit
TEL : +82-51-831-2674

KORSHIP
Shipbuilding
Offshore
Oil & Gas
Offshore wind

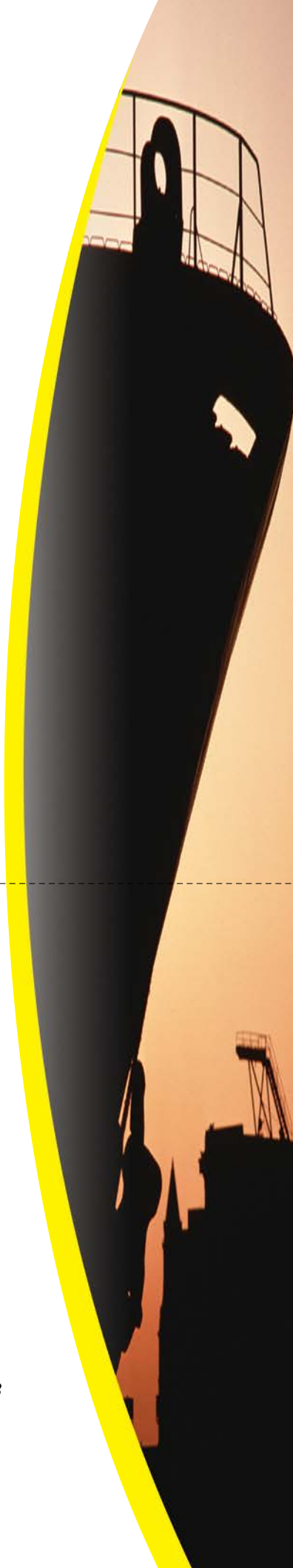
Registration No. : Youngdungpo Ra 00220
Published on Nov. 5. 2017
Publisher Yoseob Choi
Editor-in-Chief Chunghoon Lee
Senior Editor Chanyoung Choi
Designer Hyunju Seo
Marketing Manager Sungsu Park
Kijong Seo
Jongki Hong

Printed by Hyung-Je Art Printing
Printed (CTP) by Hyung-Je Art Printing
Published by PROCON

Address: Room. 708 ACE Techno Tower, 12, Dangsan-ro 2-gil, Yeongdeungpo-gu, Seoul, Korea (Postcode: 07299)
Tel : +82-2-2168-8898
Fax : +82-2-6442-2168
International : +82-10-5604-7311 (Chanyoung Choi)

www.korship.co.kr www.procon.co.kr
E-mail : korshipeditor@gmail.com
Price per Copy : ₩10,000
Annual Subscription Fee : ₩100,000

Bank of receipt	
Kiup Bank	083-038571-04-013
Kook Min Bank	757-21-0285-181
Shin Han Bank	284-05-012954
Woo Ri Bank	182-07-168838
* Deposit person : PROCON (Choi Yo Seob)	



Application of Subscription

Company's Name :

Applicant :

Address :

Term of Subscription : From M/Y ~ To M/Y

Tel : Fax :

Rate of Subscription : 1 Month / 10,000(Korean Won)
1 Year / 100,000(Korean won)
(Air postage will be charged for foreign countries.)

Inquiry : Tel / +82-2-2168-8898
Fax / +82-2-6442-2168
E-mail : victory@procon.co.kr